

Ceramics

AS AN AREA OF

INDUSTRIAL ARTS INSTRUCTION IN PENNSYLVANIA PUBLIC SCHOOLS

SUBJECT AREAS

Automotive

Ceramics

Electricity

Graphic Arts

Home Mechanics

Metal Forming

Metal Machining

Planning

Plastics

Sheet Metal

Textiles

Woodworking



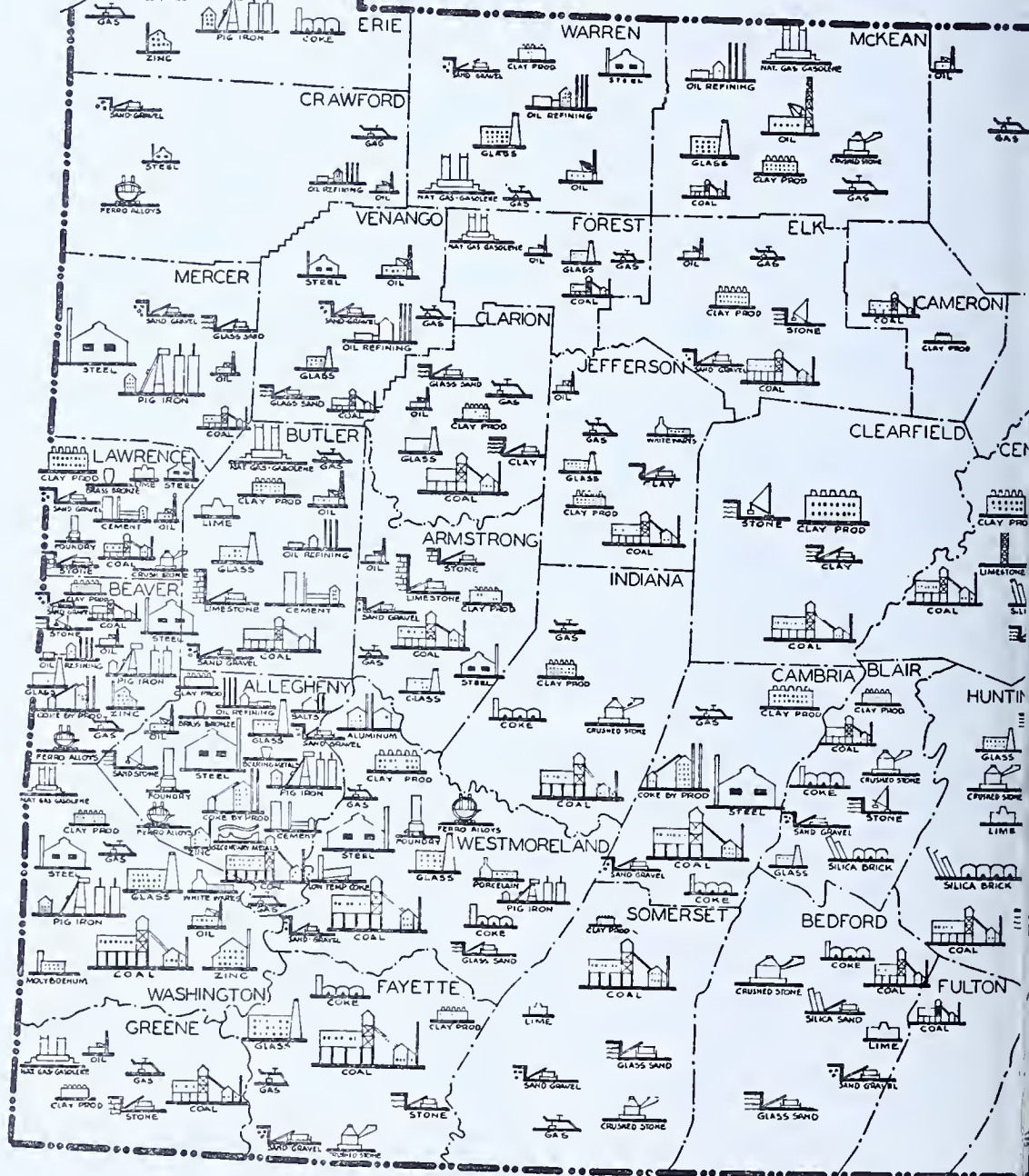
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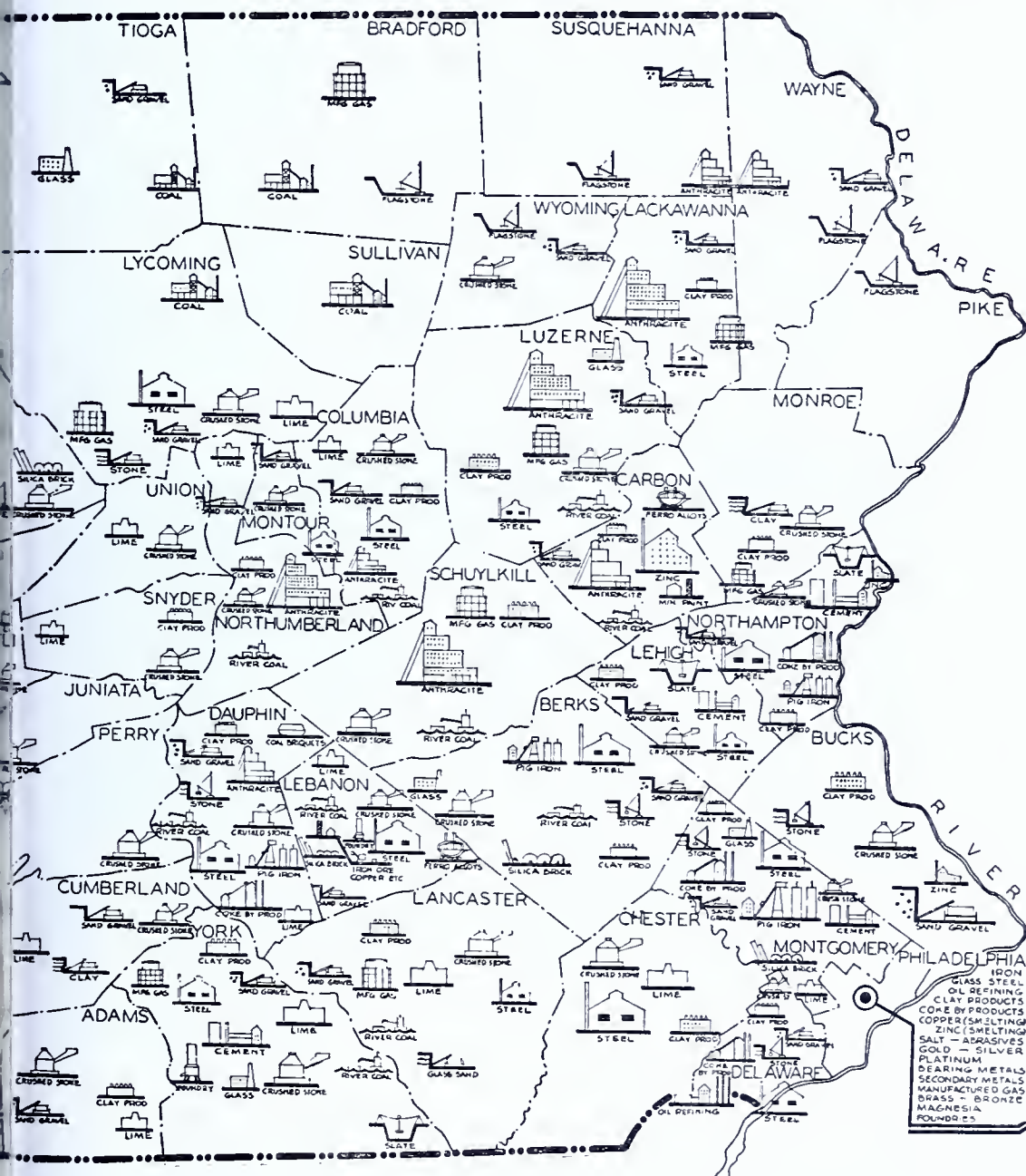
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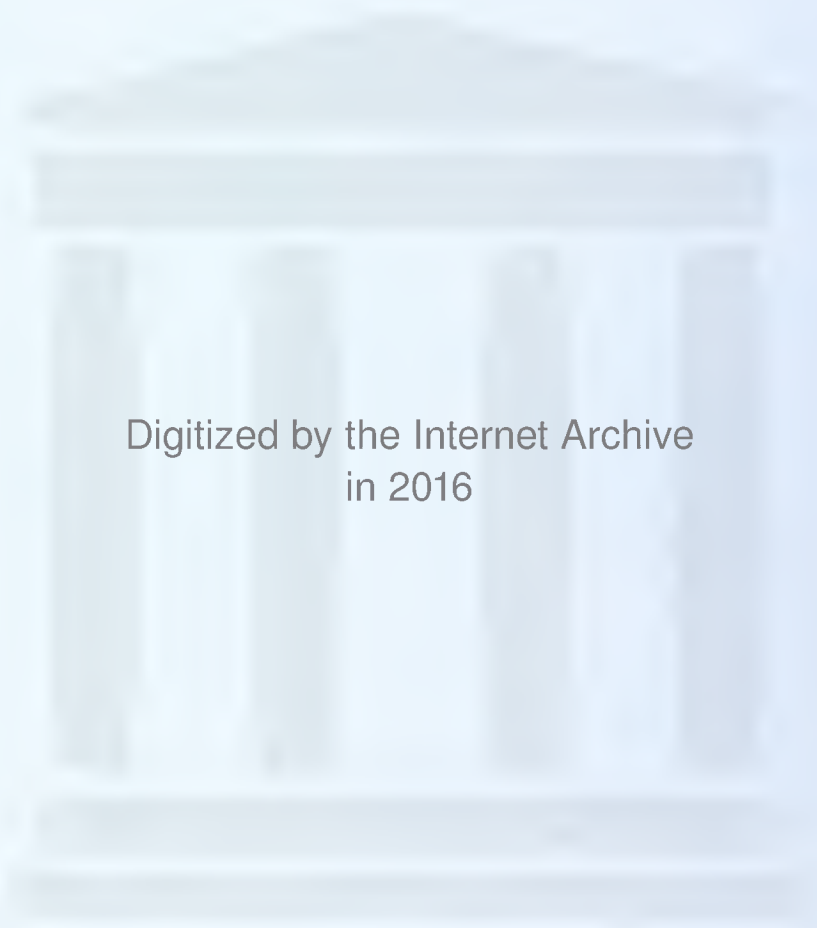
SYMBOLIC MINERAL INDUSTRIAL MAP OF PENNSYLVANIA

SIZE OF SYMBOLS REPRESENTS THE RELATIVE
GENERAL ECONOMIC IMPORTANCE OF THE
INDUSTRIES IN EACH COUNTY.



PENNSYLVANIA'S MINERAL HERITAGE





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Foreword

CERAMICS IS ONE OF A SERIES OF BULLETINS on specific areas of instruction in the broad field of Industrial Arts Education. It supplements *Industrial Arts in Pennsylvania*, Bulletin 331, published in September, 1951 by the Department of Public Instruction, by presenting details pertaining to Ceramics as an Industrial Arts school subject.

In response to the need manifested in requests from Pennsylvania educators for information and assistance in the field, this bulletin was prepared by Lyle E. Weissenfluh, Adviser, Trade and Industrial Education, and Byron J. Keller, Area Coordinator, Industrial Education, under the direction of George M. Schaffer, Chief, Trade and Industrial Education. Photographs were taken by Lyle E. Weissenfluh at South Mountain Junior High School, Allentown; Allentown High School, Allentown; Springfield Township School District, Montgomery County; and Altoona High School, Altoona.

In preparing this bulletin the authors have enlisted the valuable assistance of a number of outstanding teachers in the field of Ceramics. Notable contributions were made by Oscar Goering, Lansdale Joint Schools, Lansdale; David O. Miller, South Mountain Junior High School, Allentown; Charles S. Berberian, Allentown High School, Allentown; and Lloyd A. Wendel, Altoona High School, Altoona.

The authors wish to express their sincere appreciation to these teachers for their technical assistance and their review of manuscript.

The end leaves, "Pennsylvania's Mineral Heritage," are printed by courtesy of the Department of Internal Affairs.

Ethel M. Rolston, Editorial Assistant, Department of Public Instruction, has edited this bulletin under the direction of Rachel S. Turner, Editor.



Acting Superintendent of Public Instruction

July 1955



Department of Public Instruction

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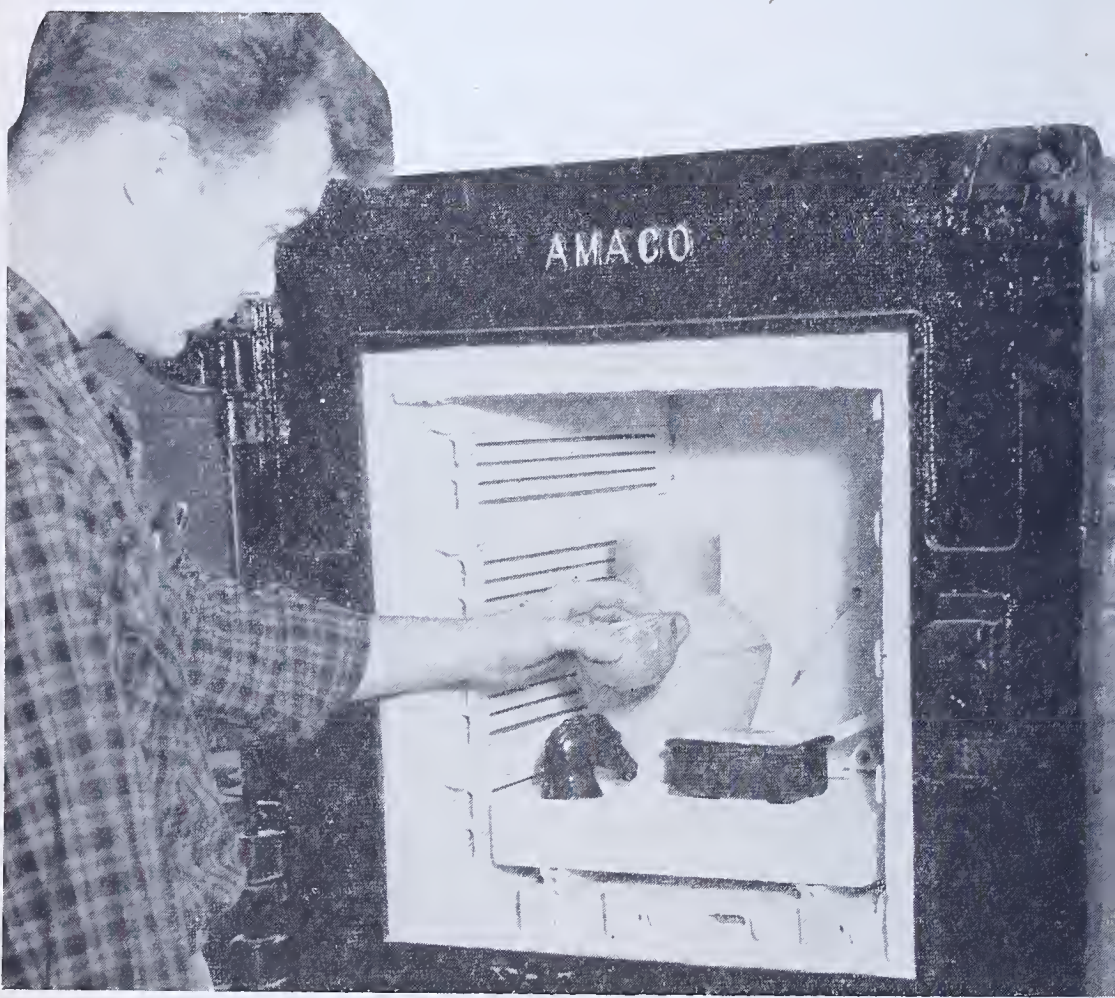
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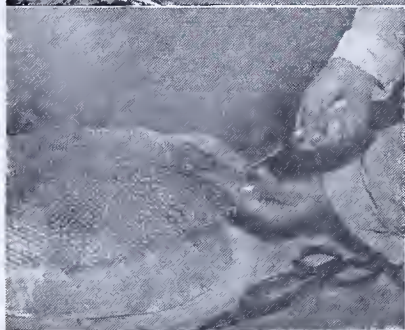
Introduction

WORKING WITH CERAMIC MATERIALS, materials of the earth processed by fire, is an ancient and universal art yet as modern and vital to social progress today as any other craft. Ceramic products are used by everyone, every day. We eat on dinnerware, drive on fine highways, enjoy "picture windows" and beautiful pieces of pottery, live in brick and concrete masonry houses, all because of the modern ceramics industry. The ceramic industry, in producing pottery, glass, cement, brick, tile, and gypsum products, has contributed much toward improving standards of living. These products have made our houses, churches, schools, and factories safer, more livable, more healthful, and more beautiful. The ceramic industries with their great variety of products form a basic part of our economic life because of the great number of people they employ.

Because of the differences in educational concepts and backgrounds of administrator and teacher, because of variation in the time pupils spend in the activity, in the amount of funds available for equipment and supplies, as well as other factors, no attempt is made in this bulletin to set up a common course of study applicable to all situations, or to tell the teacher what to teach, or how to teach, or what equipment he should have in his shop. From the Learning Units in Chapter 2 of this bulletin, the teacher may select the course content which best answers his particular aims and objectives. The time and equipment available to pupils in the ceramics course must also be considered.

Suggestions for the administrator include information related to establishing or enriching the ceramics unit of a comprehensive general shop.

Matters pertaining to Industrial Arts in general are not discussed in this bulletin. For such material the reader is referred to Bulletin 331, *Industrial Arts in Pennsylvania*, published by the Department of Public Instruction in September, 1951.



OUTDOOR LAWN ORNAMENT—BIRDBATH

Upper Left: Troweling concrete to edge of sweep.

Upper Right: Finishing base of birdbath using a fine stone.

Middle Left: Preparing wire mesh framework for bowl.

Lower Right: Finishing bowl.

Lower Left: Applying paint.

1 *Ceramics*

AS A SCHOOL SUBJECT

THE CERAMIC INDUSTRY IN PENNSYLVANIA is one of the nation's leading producers of ceramic products. Most people today think only of pottery in connection with ceramics, but actually the term applies to a broad field of mineral industries. It is the field of producing and manufacturing products from nonmetallic minerals and rocks through the application of intense heating or firing processes. Drainage tile, spark plugs, glass wool, welding rod coatings, refractory brick for steel furnace linings, and optical glass are some of the articles made from such ceramic products as cements, glass, refractories, clay products, white wares, enameled ware, and abrasives.

Because Pennsylvania is a leading producer of ceramic products, it is reasonable to think that if ceramics is to meet its broad objectives, it must become a more prominent part of the total industrial arts program of the Public Schools.

Pupils should develop an appreciation of the importance of ceramic products in everyday living. Experience in working with such non-metallic earth products as clay and cement, clay products such as brick and tile, concrete structural products, Keene cement, glass, and ceramic enamels will not only add to a pupil's general education but will also develop an appreciation of the importance of these products in industry.

Aims and Objectives

The specific aims of Ceramics in the Industrial Arts program are:

1. To teach appreciation for pottery, concrete, brick and concrete masonry, glass, tile, and the use of ceramic enamels on metal.
2. To develop hobbies and beneficial use of leisure time.
3. To teach industrial practices and applications insofar as possible.
4. To give the pupil an additional mode of self-expression.
5. To teach the principles of design.
6. To teach correct procedures for making or repairing concrete, and brick and concrete masonry objects about the home.
7. Planning concrete or masonry work intelligently.
8. Understanding the contributions of ceramics to business, industry, culture, education, and the professions.

9. Providing a background of knowledge and minor skills leading to the intelligent selection of a vocation.
10. Knowing and understanding the various ceramic processes and products that are important to the average homeowner.

Materials, Tools, Methods and Processes

MATERIALS

A wide variety of materials should be used to meet the broad objectives of industrial arts. Ceramics is more than making pottery. It should include work with such materials as brick, portland cement, concrete masonry units, tile, glass, Keene cement, and ceramic metal enamels.

TOOLS

The common tools of the pottery worker, stone mason, bricklayer, concrete worker, tile setter, and glazier should be found in this area of instruction. In the pottery area will be found such equipment as a kiln, potter's wheel, jiggering machine, modeling tools, sgraffito tools, scrapers, sieves, fettling knives, bench whirler, etc. In the masonry area such tools as masons' trowels, edgers, floats, mixing devices, levels, pointing tools, etc., will be found. In the glassworking area pupils will use such tools as regular and circle glass cutters, abrasive wheels, drills, modeling tools, etc. Keene cement work will embody the use of many hand tools used by the woodworker as well as a wood-turning lathe. In the metal enameling area, mixing and measuring equipment and kiln will be in evidence.

METHODS AND PROCESSES

Even though the ceramics area of a comprehensive general shop will be small, much can be taught about the current activities in the present day ceramic industry. Firsthand experiences in slip casting, bricklaying, concrete masonry work, concrete work, glass work, and metal enameling will be afforded the pupil. These experiences will aid in developing consumer intelligence, hobbies, and will have a utilitarian value from the standpoint of home maintenance and repair. Slip casting, press molding, glass etching and frosting, and clay firing—all industrial processes—can be easily duplicated to match the basic process found in industry. For instance, the manufacture of brick can be taught very realistically by using a meat grinder to make a miniature "pugmill" or through the purchase of a miniature pugmill.

Other industrial processes such as the manufacture of cement, pottery pieces on a production scale, floor, wall, and decorative tile,

and glass products, can be taught through such teaching devices as charts, movies, filmstrips, and field trips.

Ceramics as an Integral Part of a Comprehensive General Shop

This bulletin is mainly concerned with ceramics as an integral part of at least four activities in a comprehensive general industrial arts shop. This area of instruction should be planned to accommodate five to ten pupils.

Ceramics should be adjacent to or combined with other dust-producing areas such as woodworking rather than graphic arts, machine shop, or electricity. It is also advantageous to be close to or combined with woodworking as the pupil will find it necessary to make wooden forms for Keene cement work, concrete work, and plaster of Paris molds for slip casting of clay.

Occupations

Pennsylvania has long been recognized as a great industrial Commonwealth, but many fail to realize the extent of this greatness. It is both the leading producer and possessor of minerals. Like the steel industry, ceramics is a "multibillion" dollar industry reported to be shipping \$3,500,000,000 worth of products each year!¹ The ceramic industries are a vital part of the economic system of the Commonwealth as is evidenced by the fact that they provide employment for more than 300,000 persons.

Knowledge of the occupations within the ceramic industry should not be omitted from this unit of instruction. Included should be some information relative to the various occupations, wage and hour regulations, union organizations, apprenticeship programs, opportunities for promotion, the effects of the ceramic industry on social, economic, and political life, and new uses of ceramic products. The Dictionary of Occupational Titles lists the following numbers of distinctly different occupations in these categories: cement—100; porcelain and pottery—221; brick and tile—400; glass—153. This is a total of 874 different kinds of jobs directly concerned with the production of ceramic ware. Two-thirds of all the ceramic engineers are employed in five states—Pennsylvania, Ohio, New York, New Jersey, and Illinois. Not only are there many workers employed in the manufacture of ceramics but there are also many people doing ceramic work in other industries. For instance, two major uses of

¹*A Career in Ceramics, 1954*, Pennsylvania Ceramics Association, Inc., Mineral Industries Building, University Park, Pa.

clay products in these industries include construction work and the production of manufactured materials. The use of bricks, concrete, tile, and plaster means employment for bricklayers, concrete workers, tile setters, and plasterers and, although these workers belong to the construction industry, they use ceramic products. In the same manner, the steel, petroleum, coke, and baking industries, and electrical, photographic, and chemical manufacturing are vitally dependent upon ceramic products.

The ceramic industry is an important and stable one in our economy and needs many technically trained men, as well as workers who are familiar with the tools, properties, products, and uses of ceramic materials. The demand for personnel in the field of ceramics is many times the supply and from reports relative to the new trends and developments of our times, the demand will become even greater. Research is now in progress to develop ceramic materials for extreme physical conditions in guided missiles, jet engines, the electronics field, and in atomic energy utilization. The challenge of new demands for ceramic materials has never been greater. This will tend to increase the demand for ceramic engineers, technicians, and workers for the processing of ceramic materials and the making of ceramic products.

Information relating to the ceramic industries with respect to materials, occupational requirements, salaries, working hours, conditions, etc., may be found in the following:

A Career in Ceramics or Engineering and Technology. Pennsylvania Ceramic Association, Inc., Mineral Industries Building, University Park, Pennsylvania. 1954.

Ceramic Age. Volume 51, pp. 297-315.

Dictionary of Occupational Titles, Parts I and II. U. S. Employment Service, U. S. Government Printing Office, Washington, D. C. March 1949.

Industrial and Commercial Geography. Smith, J. R., and Phillips, M. O. pp. 241-258.

Materials of Construction. Fryklund, V. C., and Sechrest, C. H.

Materials of Industry. Mersereau, S. F., pp. 240-242, 304-329.

Monthly Labor Review. Volume 63, No. 2, August 1946, pp. 210-216; Volume 65, November 1947, pp. 549-551; Volume 69, No. 4, October 1949, pp. 368-369.

Occupational Outlook Handbook. Number 998, United States Department of Labor in Cooperation with Veterans Administration, U. S. Government Printing Office, Washington, D. C. 1951.

Pottery in the United States. Stiles, H. E. pp. 50-72.

Stories of American Industry. U. S. Department of Commerce. pp. 43-46, 76.

The Potter and the Glazier. Industrial Bulletin, New York State Labor Department, October 1948. pp. 34-36.

Wage Structure of the Structural Clay Products Industry. *Monthly Labor Review*, Volume 63, No. 2, pp. 210-216. August 1946.



2 *Learning Units*_____

THINGS TO DO AND THINGS TO KNOW

IN ANY INDUSTRIAL ARTS ACTIVITY THE BASIS for the selection of subject matter to be included as learning units should be determined through a thorough study of the operations and processes of industry. This study will provide a list of the practical or manipulative learning units as well as informational content. In view of this, the purpose of the bulletin is to suggest what is needed in developing ceramics as an area of instruction in a comprehensive general shop. It is suggested that ceramics be divided into the following five subareas: (A) Pottery and Tile, (B) Keene Cement, (C) Concrete and Masonry, (D) Metal Enameling, (E) Glassworking. A ceramics area may be established with only several of the subareas and later increased to the total number.

“Things To Do” as listed in the bulletin are suggestions for use in planning a ceramics area of instruction. The basis for the selection of subject matter was made from an analysis of the processes of industry and those processes which are adaptable from the standpoint of hobby development and home maintenance and repair. Adequate texts and study guides are listed in the annotated bibliography on pages 64 through 77.

PART I. THINGS TO DO

Unit A: Pottery and Tile

The words *ceramics* and *pottery* are often used interchangeably today among laymen. Actually, ceramics means anything that has been fired—as in a kiln, such as pottery, brick, enamel, glass, sewer pipe, terra cotta, and tile. Pottery is just one phase of ceramics and refers properly to types of ware made of clay. Pottery and tile-making until a few years ago required expensive equipment and a degree of skill but today with the new clays that are available, the well-written texts and relatively inexpensive equipment, the picture has changed. With these new materials a pupil can make vases, bowls, candlesticks, tiles, ash trays, and figures that can be just as attractive, decorative, and colorful as those to be seen in gift and china shops. Also to aid the beginner are new types of clay that have recently been developed to harden and form finished pieces

of pottery without being fired in a kiln. One type of clay now hardens at normal temperatures; another may be fired in an ordinary kitchen oven. With clays of this type it is possible for a pupil to pursue this activity in the home and an additional area of instruction is practicable in a comprehensive general Industrial Arts shop without the immediate need of an expensive kiln used to harden regular pottery clays.

The list of suggested *Things To Do* will cover all experiences in pottery and tile-making to a very limited degree. For the beginner, making a clay tile is easy and familiarizes him with the feel of clay, the way of handling clay, and imparts an early feeling of self-satisfaction. Tiles can be made of any kind of clay, either the self-hardening types or the ordinary kind that is hardened by firing. Tiles may be left flat and decorated by means of designs using paints and glazes, or the design may be incised, executed in relief, or inlaid.

The following is a partial listing of things to do in the various sections of the ceramics area:

POTTERY AND TILE

1. Make a work bat
2. Make a tile or several tiles for a serving tray
3. Make a pinch pot or bowl (see pages 7 and 38)
4. Make a dish or vase
5. Make a tray, slab method
6. Make a tray, fold-up method
7. Make a box, slab method
8. Make a covered jar, slab method
9. Make a pot, coil method (see page iv)
10. Make a figure
11. Make a ceramic pin
12. Use various shaped sticks, combs, modeling tools to decorate ware
13. Brush or spray on colored engobes
14. Decorate ware using various sgraffito tools and the following processes:
 - a. Sgraffito
 - b. Slip or engobe painting
 - c. Slip tracing
 - d. Encoustic or inlaid design
 - e. Incised line
 - f. Raised modeling
 - g. Sprigging
 - h. Applied clay design
 - i. Banding
 - j. Underglaze painting
 - k. Overglaze painting
 - l. Forming texture
 - m. Relief



15. Prepare ready-made glazes
16. Apply glazes by:
 - a. Brushing
 - b. Dipping
 - c. Pouring
 - d. Spraying
17. Load a kiln (see page vi)

18. Read a pyrometer
19. Use cones as temperature indicators
20. Throw a simple dish or bowl using a potter's wheel as follows:
 - a. Prepare clay
 - b. Center on wheel
 - c. Use water as lubricant
 - d. Hollow and pull up clay (see picture on page 64)
 - e. Trim to finished size



21. Make a template
22. Make form on a jigger machine for plain dish or bowl
23. Mold-making
 - a. Press mold
 - (1) compute amount of plaster of Paris and water to mix
 - (2) make a press mold
 - (3) use a press mold

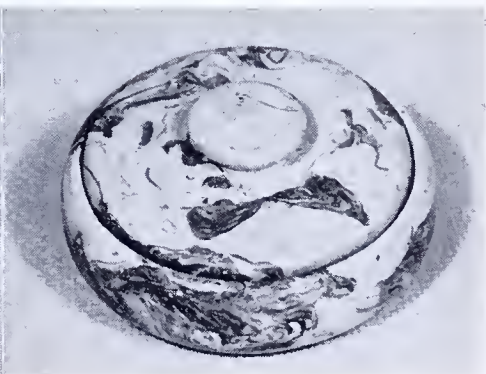
- b. Make a one-piece mold for slip casting
- c. Make a two-piece mold
 - (1) prepare and process slip
 - (2) cast in a one-piece mold
 - (3) cast in a bisque mold
 - (4) cast in a two-piece mold
 - (5) open a mold
 - (6) fettling a casting

Unit B: Keene Cement

The interesting possibilities of Keene cement are not widely known. It is a closely grained white rock formation, reduced through dehydration from calcium sulphate or gypsum. This material when properly mixed is easily worked, combines readily with mineral colors, may be poured or molded, shaped on a lathe, hand-carved or finished with ordinary hand woodworking tools. Contrary to widespread notion, Keene cement is not plaster of Paris even though calcium sulphate forms the base of both materials. Keene cement has no affinity for atmospheric moisture. A catalytic agent is used to control setting time but does not have any particular effect on the properties of the cement. It is interesting to note that by mixing mineral colors with Keene cement, many beautiful marblelike effects can be made. In casting, the cement in a semiliquid state is poured into molds or forms. Dependent upon the shape and finish desired, the mold forms may be of wood, metal, cement, plaster of Paris, or other materials. Keene cement is not a medium confined to boys' use only. It has been found that girls handle this material very well and that all find satisfaction in working with it.

KEENE CEMENT

1. Make a mold for a tea tile
 - a. Mix Keene cement
 - b. Pour cement into mold
 - c. Remove the casting from the mold
 - d. Polish the casting



2. Make a penholder
3. Make a project by turning on a wood lathe
 - a. A candlestick
 - b. Candy dish
 - c. Bud vase
4. Make an ash tray
5. Make book ends
6. Make a modernistic lamp
7. Polish a turned piece of work
8. Waterproof a vase

Unit C: Concrete and Masonry

Since the time man began building shelters, he has needed something to hold his materials together and to fill in spaces. Mud was first used and about 5,000 years ago the Egyptians used lime mortar for this purpose. Natural cement was used by the Romans and continued to be used extensively until the development of the portland cement process. In 1824 the natural cement was improved by the addition of clays to the limestone as it was being burned in the kiln. It was then ground into powder. Because this hardened cement resembled a stone found on the Isle of Portland, it was named portland cement. Portland cement is made of limestone and clay or shale with a small amount of gypsum added. Cement is an ingredient in mortar and plaster as well as in concrete.



CONCRETE

1. Plan the procedure for doing a job using concrete
2. Read a working drawing
3. Make a working drawing for a project using concrete
4. Make a form for concrete project
5. Prepare a form for pouring
6. Mix concrete
7. Pour concrete
8. Finish concrete surfaces
 - a. Strike off
 - b. Wood float
 - c. Steel float
9. Make joints
10. Smooth joints
11. Patch concrete
12. Remove forms
13. Color cement
14. Reinforce concrete

MASONRY

1. Read a working drawing
2. Plan the procedure for doing a job
3. Mix mortar
4. Determine and test for bond
5. Bed joints in stretcher courses
6. Make head joints in stretcher courses
7. Make cross joints in header courses
8. Make closure joints in header and stretcher courses
9. Finish joints



Unit D: Metal Enameling

Things to do in this area of ceramics should include the following activities:

1. Prepare copper for enameling
 - a. Scour
 - b. Apply acid
2. Treat for cleanliness
3. Apply enamels
 - a. Counterenameling
 - b. Dusting method
 - c. Spatula method
 - d. Dipping and pouring method
 - e. Spraying method
 - f. Painting method
 - g. Stencil method
4. Firing
 - a. Preparation of kiln
 - b. Preheating kiln
 - c. Choosing holder for enameled piece
- d. Placing piece in kiln
- e. Removing piece from kiln
- f. Cooling piece
- g. Removing oxidation from exposed metal
5. Finishing enameled pieces
 - a. File or stone rough edges
 - b. Round off sharp corners
 - c. Smooth stilt marks
6. Buff enameled surfaces
7. Wax enameled surfaces
8. Apply liquid gold and platinum to fired enamel pieces
9. Apply "Overglaze" decorating colors
10. Apply glass decorating colors
11. Attach jewelry findings
12. Hard solder

Unit E: Glassworking

The history of glass starts many thousands of years before the Christian era. The Romans fought for and treasured pieces of this material, as did wealthy men of other countries. Alchemists and scientists of all ages have worked to produce an ever-increasing flow of products made from sand, limestone, soda ash, and other natural products added to vary the properties of the finished product—glass. In spite of the fact that we come in contact with glass continually, it is almost completely ignored in the industrial arts shop.

There are many properties of glass that are just as important as its transparency. For example: it is noninflammable; can be shatter-proof; is an excellent insulator; is nonporous; will not shrink; is mildew proof; its colors will not fade; it can be used for distortion free microscopes and lenses, for light bulbs and radio tubes; it can be blown, molded, pressed, and rolled; and to add to its attractiveness, it may be polished, colored, etched, frosted, chipped, gilded, or engraved by cutting wheels. Most of the processes just mentioned are within the abilities of the industrial arts pupil. Opposite is a list of suggested things to do in glassworking:

GLASSWORKING

1. Cut glass to a specific size
2. Smooth rough edges of cut glass
3. Bore a hole in glass
 - a. Prepare drilling tool
 - b. Prepare glass
4. Bend glass tubing by the application of heat
5. Frost a sheet of glass or a water glass
 - a. Use water, carborundum dust, and sheet copper method
 - b. Use a chemical preparation
6. Chip entire surface of a piece of clear or frosted glass
 - a. Clean surface
 - b. Apply animal glue
 - c. Clean chipped surface
7. Chip surface of glass to clear line or bevel
8. Chip surface of glass to frosted or clear line border
9. Chip letters or numerals with clear background
10. Chip background with clear letters or numerals
11. Etch an entire piece of glass
 - a. Prepare surface using wax
 - b. Inscribe line or design
 - c. Apply chemical preparation
12. Emboss entire surface
13. Etch surface with a one-line border or a two-line border
14. Etch one- or two-line border with clear background
15. Make a set of matched drinking glasses having an etched design; or with a clear design and the rest of the glass stippled
16. Cut glass to a curved line
17. Make a stained glass panel
 - a. Draw design of simple rectangular shapes for stained glass
 - b. Cut rectangular pieces of glass according to design outline
 - c. Mount cut pieces on sheet of glass using wax or plasticene
 - d. Paint line work on assembled pieces
 - e. Apply color pigment to pieces
 - f. Fire pieces
 - g. Rewax or plasticene fired pieces and inspect
 - h. Complete "leading" process
 - i. Solder lead joints
 - j. Cement pieces
 - k. Fit into frame
18. Make a glass mosaic
 - a. Cut scrap glass (plain or colored) into small squares
 - b. Draw pattern

- c. Paste glass face downward on design
- d. Fit wooden frame around the completed work
- e. Add cement plaster (thin layer to sink into all crevices between glass squares)
- f. Add second coat of cement plaster (thick coat added quickly to combine with first coat)
- g. Remove design after cement plaster has set

PART II. THINGS TO KNOW

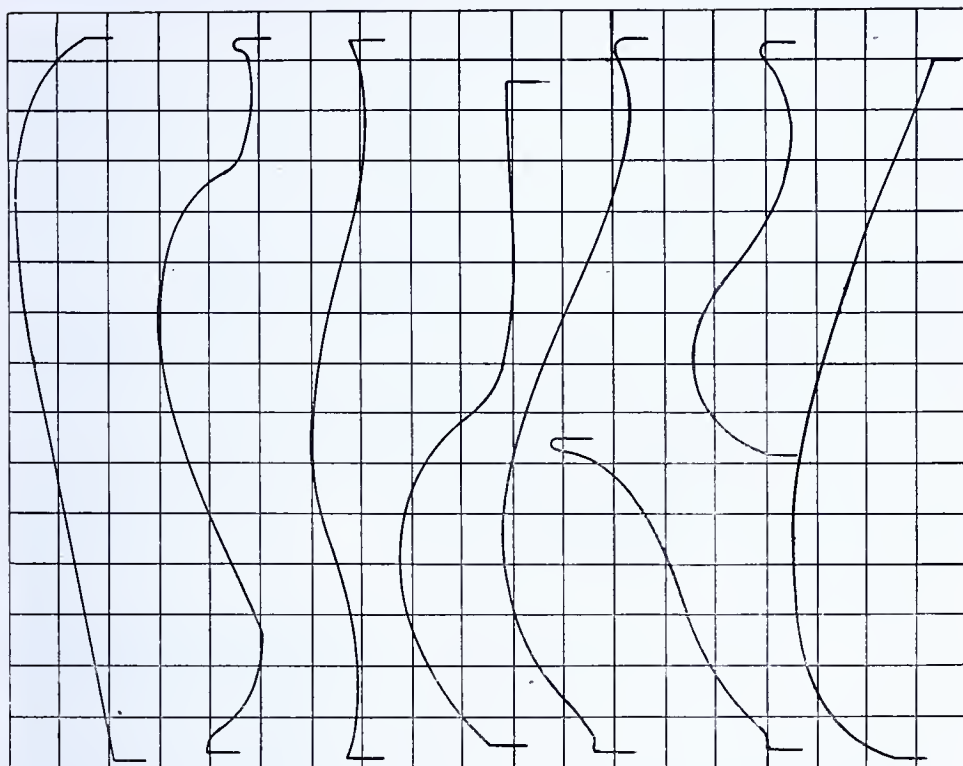
To develop a plan of instruction for the Ceramics Area which meets the nonmanipulative values and outcomes of an Industrial Arts program, the teacher must allow time for instruction relative to the technical aspects of consumer knowledge, and to the guidance values inherent in any good program. Things pupils need to know about industrial tools, materials, and processes are not all presented in the "Doing" experiences of school shopwork. To know how mass production of terrazzo tile, sewer tile, and portland cement are accomplished cannot be a "doing" experience in the school shop. These and many other experiences become the "knowing" experiences of the course, and are best taught through demonstrations, lectures, or information sheets.

The decoration of ceramic projects can become an interesting phase of ceramic instruction. On pages 28 through 35 of this bulletin may be found a collection of Indian signs which decorated many of the simple but graceful shapes of American Indian bowls and vases. Many of the pieces of pottery found in the ancient cliff dwellings and on the Indian reservations of today, tell complete stories of Indian life and prowess. These stories are easily decipherable by those who are familiar with the meanings of the simple symbols used as decorations. Ceramic craftsmen of today imitate freely the shapes and the ancient designs of these early Americans.

The following lists of "Things To Know" are suggested for use in planning a ceramics area of instruction. The list is divided into 5 units making up the ceramics area: pottery and tile, Keene cement, concrete and masonry, metal enameling, and glassworking.

The teacher will select from this list only those "knowing experiences" which correlate with the "doing" experiences and which fit his objective, time schedule, equipment, and grade level taught. The following lists comprise *things to know* in relation to the suggestions on *things to do* included in Part I of this chapter:

Unit A: Pottery and Tile



1. Fundamentals of Design in Clay

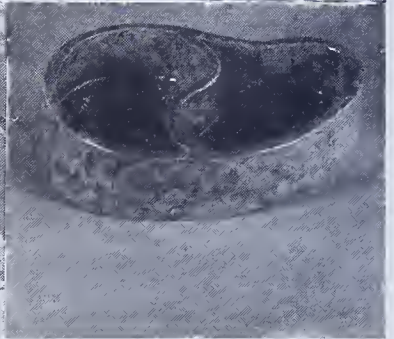
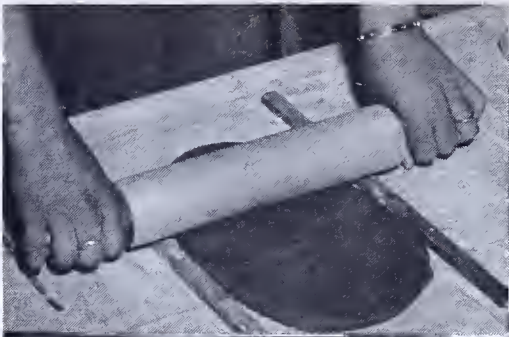
- a. Types of clay available
- b. Function and beauty of the design
- c. Colors in and on clay
- d. Basic technique used in design

2. About Clay

- a. Basic types
- b. Qualities
- c. Kinds
- d. Composition
- e. Selection of clay for specific job
- f. Preparation of clay for use (see page 81)
- g. Salvage

3. Methods of forming by hand

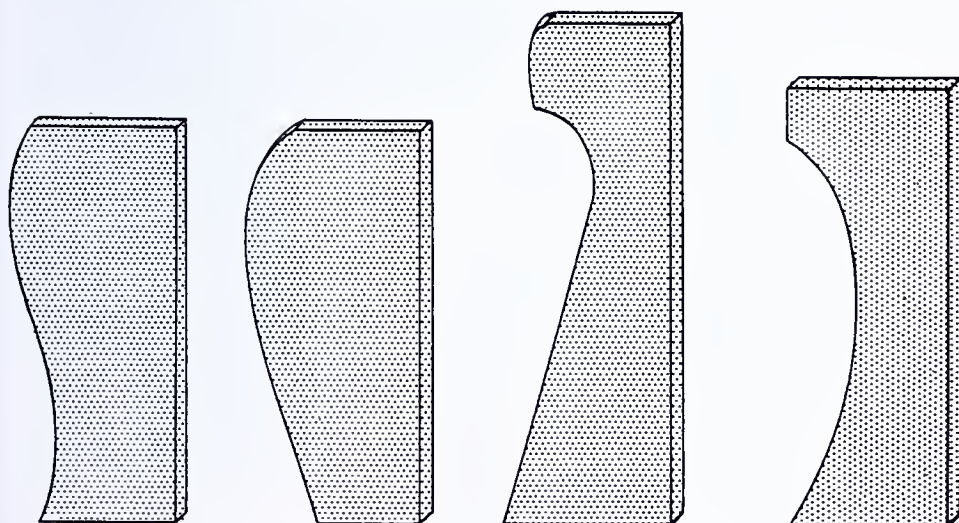
- a. Pinching (see page 7)
- b. Building with coils (see page iv)
- c. Slab method (see page 18)
- d. Figure-modeling
 - (1) shaping a block
 - (2) building up of pieces
- e. Jewelry-making



4. Decorating Techniques—(the following are basic techniques from which many variations may be developed) :
 - a. Finger marks
 - b. Tool-marking
 - c. Sgraffito
 - d. Burnishing
 - e. Application of engobes
 - f. Carving
 - g. Incising
 - h. Impressing
 - i. Applied forms
 - (1) appendages
 - (2) ornaments
 - j. Glazing—types and kinds of glazes
 - k. Slip-decorating
 - (1) slip-tracing
 - (2) slip-painting
5. Sources of Decorations
6. Firing Ware
 - a. Types of kilns
 - (1) Bisque firing
 - (2) Proper loading technique (see top of page 19)
 - (3) Temperature indicators
 - (a) Use of pyrometer
 - (b) Use of pyrometric cones



7. History of the Potter's Wheel
 - a. Origin and use through the years
 - b. Modern adaptations
8. Use of the jigger and the jolley
 - a. Use of molds and templates
 - b. How to make flatware
 - c. How to make hollow ware
 - d. How to compensate for shrinkage
9. Use of plaster of Paris—how to compute the amount of plaster to mix for a mold
10. What is slip
 - a. Function of an electrolyte or deflocculant
 - b. Proper storage of slip



Templates

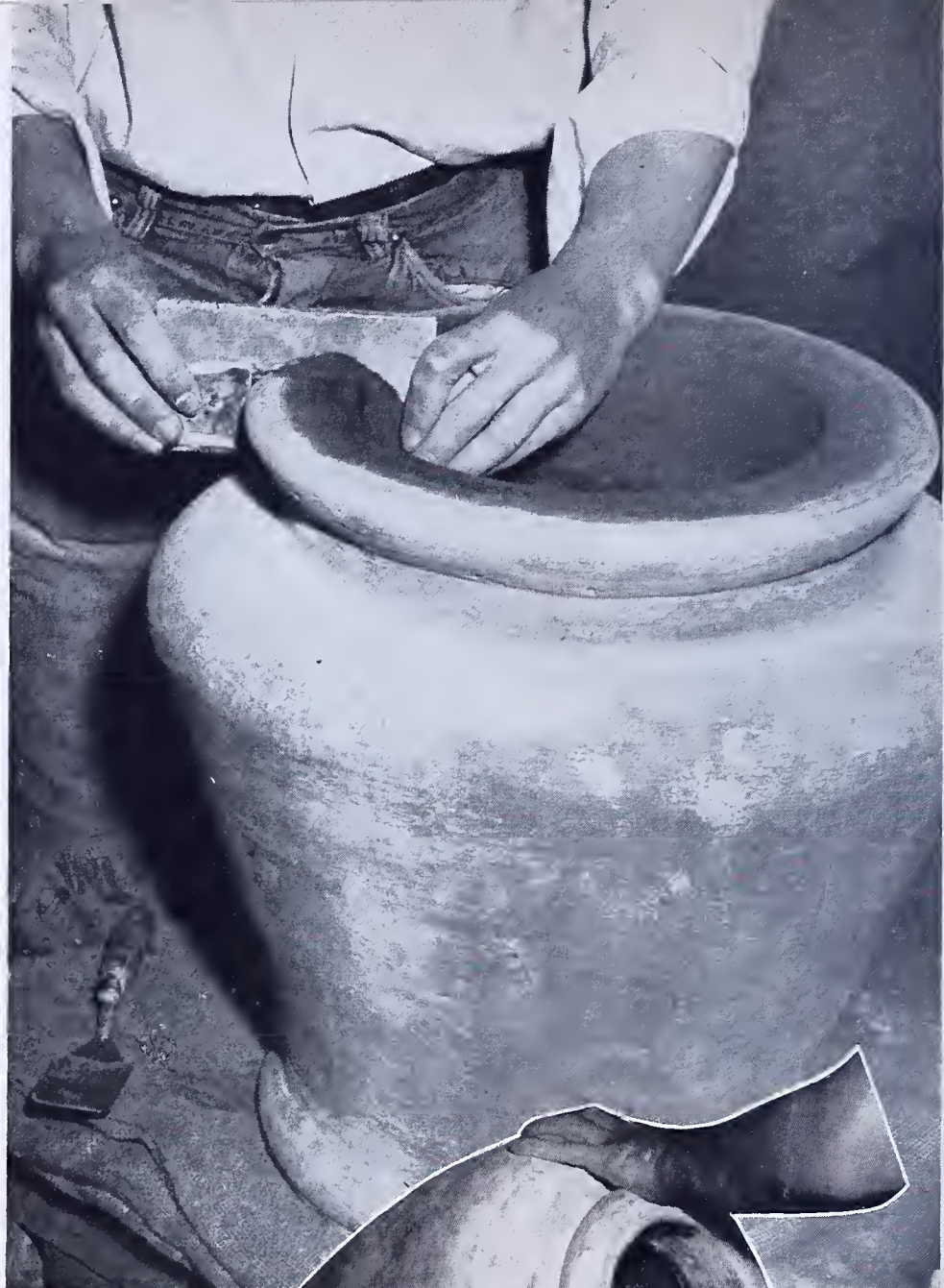


Unit B: Keene Cement

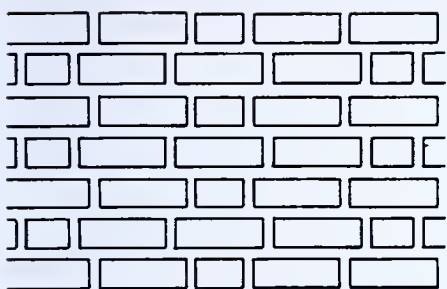
1. What is Keene cement (see Part I, page 11)
2. Types of materials satisfactory for making molds
3. How to make a mold
4. Methods used to mix, color, and cast Keene cement
5. How to choose the correct mixing and casting method for a project
6. How to prepare a mold for pouring
7. How to pour into a mold
8. Precautions to take in using Keene cement
9. Proper condition of cement for working
 - a. Tools required
 - b. Types of abrasives and lubricants
 - c. Buffing procedures
10. Lathe
 - a. Kind of lathe to use
 - b. Speeds to operate
 - c. Polishing techniques

Unit C: Concrete and Masonry

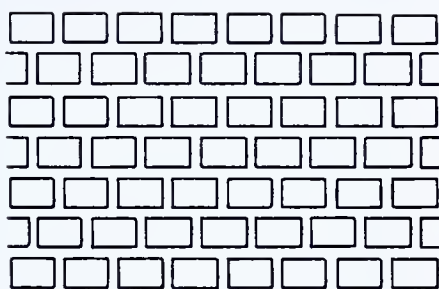
1. History of portland cement
2. Materials used in the manufacture of portland cement
3. Manufacture of portland cement
 - a. Wet process
 - b. Dry process
4. Special portland cements
 - a. White
 - b. High early strength
5. Materials used to make good concrete
 - a. Cement
 - b. Aggregate
 - c. Water
6. Proportioning
 - a. Essential properties of concrete
 - b. Quality of cement paste
 - c. Aggregates
 - d. Water-cement ratios
7. Special processes
 - a. Watertight construction
 - b. Cold weather construction
 - c. Cyclopean concrete
 - d. Lightweight concrete
 - e. Gunite
8. Selection of materials for job planned
9. Estimating quantities—measuring box
10. Mixing materials
 - a. Recommended mixtures for different uses
 - b. Classification of mixes
 - c. Consistency and workability
 - d. Hand-mixing
 - e. Machine-mixing
11. Placing mixed concrete
 - a. Tamping
 - b. Spading
 - c. Vibrating
 - d. Effects of heat and cold
12. Special finishes
 - a. Selected aggregates
 - b. Form-imparted surfaces
 - c. Rubbed
 - d. Scrubbed
 - e. Sand-blasted
 - f. Sand-floated or cement wash
 - g. Cement plaster
 - h. Stucco
 - i. Tooled surface
 - j. Wood float
 - k. Steel trowel
 - l. Painted
13. Coloring in cement and concrete finishes
 - a. Coloring pigments
 - b. Mixing colored concrete
 - c. Placing colored concrete
 - d. Curing colored concrete
 - e. Dusting
 - f. Efflorescence
 - g. Cleaning
14. Use of paints and stains
15. Protection of concrete work
16. Principles of proper curing
 - a. Result of chemical action
 - b. Effect on strength
 - c. Methods of curing
 - d. Need of moisture
 - e. Curing temperature
 - f. Initial set
17. How to buy ready-mixed concrete
18. Estimating quantity required for job
19. Manufacture of concrete masonry units
 - a. Tamp process
 - b. Vibrated process
 - c. Pressure process
 - d. Cast process
20. Sizes and shapes of concrete masonry units
 - a. Concrete block
 - b. Concrete building tile
 - c. Concrete brick



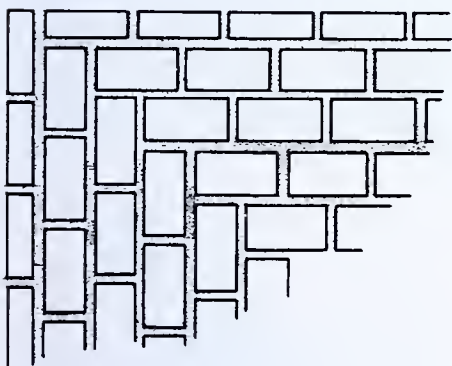
A Garden Urn



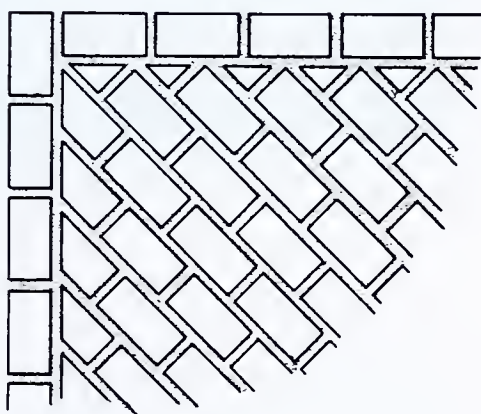
Garden Wall Bond



Header Bond



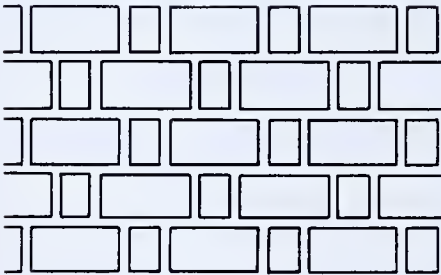
Square Herringbone Bond



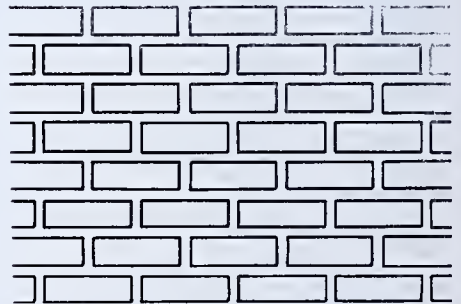
Diagonal Bond

21. Manufacture of mortar cement
22. Use of mortar cement
23. Mixing of mortar cement
24. Manufacture of magnesite cement
25. Use of magnesite cement
26. Reinforced concrete
 - a. Rod
 - b. Wire
 - c. Wire mesh
27. History of bricks
28. Composition of bricks
29. Kinds, sizes, and uses of bricks
30. Uses of concrete, concrete masonry units, bricks, glass blocks (top of page 25), and cinder blocks in construction work
31. Forms and form-making
 - a. Individual job requirements
 - b. Wood
 - c. Clay
 - d. Plaster
 - e. Metal (bottom of page 25)
 - f. Synthetic material
 - g. Glue
 - h. Earth

32. Form characteristics
 - a. Straight side
 - b. Slant side
 - c. Rounded
 - d. Undercut
 - e. Overhang
 - f. Motif
 - g. Mold
 33. Care and use of forms
 - a. Covering form surfaces
 - b. Braces
 - c. Spacers
 - d. Wire ties
 34. Application of cement tile to architectural use
 35. Concrete tile designs and finishes
 - a. Incised
 - b. Relief
 - c. Majolica
 - d. Sgraffito
 - e. Carved
 - f. Mosaic
 - g. Modeled
 - h. Textured
 - i. Burnished
 - j. Scraped
 - k. Glazed
 - l. Drilled
 - m. Colored
 - n. Slip-painted
36. Selection of materials for job planned
 37. Uses of concrete, concrete masonry, and bricks in construction work



Ideal Wall Bond



Running Bond



Unit D: Metal Enameling

1. How to select metals for enameling
 - a. Types of metals, other than copper, suitable for enameling
 - b. Materials used in acid cleaning
 - c. Precautions necessary in scouring and acid methods of cleaning
2. How to determine when copper is perfectly clean
3. How to prevent "finger marks"
4. Types of enamels—uses and sizes for the various methods of applying enamels
5. Selection of proper tools for applying enamels by the various methods
6. How to prepare kiln for firing
 - a. How to read a pyrometer
 - b. Correct temperature for firing
 - c. Importance of maintaining correct temperature for the proper length of time
 - d. How to select proper trivets, star stilts, or other holders for various enameled shapes
 - e. Importance of drying pieces before firing
 - f. Various devices such as enameling fork, spatula, or tongs used to place enameled piece in kiln
 - g. Characteristic changes of enamels and copper during firing process
 - h. How to inspect for completion of firing process
 - i. Characteristics of defects and causes of overfiring, cracking, blistering, and pinholing
 - j. Types of abrasives and acid cleaners
 - k. Precautions in use of acid cleaners
 - l. Protection of unenameled side of piece with a protective coating during firing
7. How to select and use files, steel wool, carborundum stones, and emery cloth to remove sharp edges, stilt marks, burrs, etc.
8. How to select proper buffing wheel and buffing compounds for buffing enameled surfaces
9. How to apply wax and polish
10. Characteristics of things that might be added to a fired enamel base for variety and texture
11. Technique used to apply liquid gold and platinum for proper firing temperature and length of firing time
12. Techniques used to apply overglaze decorating colors, proper firing temperature, and length of firing time
13. Techniques used to apply glass decorating colors, proper firing temperature, and length of firing time
14. How to apply findings with household cement and soft soldering

15. Necessity to use hard solder to fasten metal parts before enameling
 - a. How to hard solder
 - b. Differences between hard and soft soldering
 - c. Precautions in firing of pieces that have been hard soldered

Unit E: Glassworking

1. Early history of glass
2. How glass is manufactured
3. Properties of glass
 - a. Strength
 - b. Fabrication
 - c. Solar properties
 - d. Permanence
 - e. Expansion
 - f. Heat transmission
 - g. Light transmission
 - h. Safety
 - i. Colors
4. Varieties of glass
 - a. Polished plate
 - b. Tinted plate
 - c. Heat-absorbing plate
 - d. X-ray lead plate
 - e. Tempered plate
 - f. Mirrors (structural, wall, mantel, door)
 - g. Window (picture, single strength, double strength)
 - h. Sheet (bent, chipped, ground)
 - i. Structural (carrara)
 - j. Tanks (acid, electroplating, dyes, foods)
 - k. Plate for solid glass doors, panels
 - l. Laminated (safety, bullet-resisting)
 - m. Insulating
 - n. Blocks
 - o. Figured
 - p. Ornamental
 - q. Wired
 - r. Architectural (rough-rolled, prism, polished figured, plain figured, wired)
 - s. Structural (corrugated, heat-absorbing, glare-reducing, opalescent, cathedral, lighting)
 - t. Laboratory glass
5. Uses of glass in the home, in industry, and in science
6. History of stained glass
7. Principles of design in stained glass-making
8. Kinds and uses of decorative surface treatments
 - a. Chemical etching
 - b. Frosting by physical process
 - c. Sand blasting
 - d. Grinding
 - e. Honing
 - f. Engraving
 - g. "Italian" processing
 - h. Ceramic enameling
 - i. Photo etching
 - j. Chipping
 - k. Shading
 - l. Edging (flat-mitered, pencil, seamed, swiped, semi-round in ground or polished finish)
9. Tempering of glass for strength
10. Decorating glass with wood



Horse

3 Organization

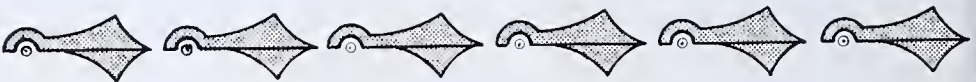
OF INSTRUCTION AND INSTRUCTIONAL AIDS

THE ALERT AND PROGRESSIVE TEACHER will make full use of every type of instructional aid available. He will study the special advantages of each type and coordinate its use in the constant challenge to find more and better ways to motivate interest and increase pupil understanding. He will make the most of such devices as blackboards, charts, diagrams, maps, photographs, filmstrips, filmstrips, filmslides, movies, opaque projectors, models, specimens, and mock-ups.

The comprehensive general shop concept of industrial arts has required the development of new methods of working with pupils. Teacher direction has given way to pupil self-direction and learning under the guidance of the teacher. This concept of shop instruction requires different types of learning and teaching environment. Individual pupil interests must be met in this type of a program; therefore, individual work in a comprehensive general shop may involve as many different jobs as there are pupils in the class. Pupils seem to "follow the leader" and make the same projects or make a project that has been successfully made before. Because of the opportunities for differentiation the projects constructed should cover a wide range of interests during the school year. Thus it is necessary to plan for methods of pupil self-direction, pupil planning, and an organization of instructional materials, devices, records, and equipment that will relieve the teacher of time-consuming detail.

The Course of Study

A good course of study should be used for every area of the comprehensive general shop. Courses of study may differ in their content



Bird



Clouds and Rain—Plentiful Crops

and appearance—they need not correspond exactly to any given pattern. In a broad sense a name can be applied to any organized set of guiding outlines or plans which, when used, will guide the teacher and pupils through a definite program of instruction and learning.

In the preparation of a course of study for the ceramics area, the teacher must first acquaint himself with the factors which will influence his particular teaching situation. For example:

1. Age range of students to be taught
2. Grade levels
3. Length of the class periods
4. Number of periods per week and the total number of periods for the school year
5. Previous experience of pupils
6. Tools, equipment, materials, and other facilities available
7. Special considerations pertinent to his school

A thorough study of these factors will answer many questions for the teacher and allow him to effectively plan his teaching program.

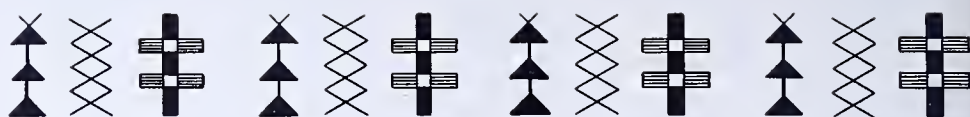
The course of study is the *teacher's road map*. Without a plan and suitable records, industrial arts pupils drift through the year doing very little and in some instances miss the most important values of shopwork.

Project Selection

Beginning projects should have a small number of basic learning units, selected by the teacher and required of all pupils as standard projects. Such assignments are necessary in order to get the class under way without delay and confusion and in order to teach the basic and fundamental tool processes on which a pupil can build. These basic teacher-selected projects should be kept at a minimum. Modern industrial arts concepts and the broad aims of industrial



Arrow Point



Rocks

arts instruction require fewer teacher-directed projects and more pupil-teacher planning of projects. The natural interests of pupils should be learned before projects are planned. This procedure will lead to the construction of more functional projects and to more purposeful activities. Thus industrial arts instruction becomes more meaningful to the pupil.

Projects planned by the teacher alone or by pupil-teacher planning techniques should be based on the following criteria:

1. Contain several old and several new learning units
2. Be simple enough to be in the range of the pupils' abilities, yet difficult enough to challenge their resourcefulness
3. Be of such a nature that they can be handled under school shop conditions
4. Embody good design and have some intrinsic value to the home, school, or community
5. Be of such character that they can be completed within the instructional time allowed
6. Have value and interest in the pupils' estimation

The following is a list of project suggestions which might be useful in stimulating activity in the various divisions of the ceramics area.

These items can be made by using the pat or drape mold method, by casting and by hand-throwing or jiggering methods. Variations in decoration may be obtained by use of underglazes, overglazes, sgraffito work, low relief, sprigging, and by decorating with gold. Additional decoration may be accomplished by variations in glazing techniques such as textured glazing, pebbled glazing, crackling, etc. Decalcomanias may also be used.



Coyote Tracks



Sun

Suggested Items for Projects

Unit A: Pottery and Ceramic Ware

Ceramic jewelry

- Belt buckles
- Box lids
- Brooch settings
- Candy dishes
- Ceramic beads
 - Bracelet
 - Necklace

Ceramic buttons

Ceramic gems (brightly glazed —mounted in metal)

- Bright glaze
- Cabochon
- Cameo
- Design
- Intaglio

Cuff links

Fraternal emblems

Medallions

- Neckware
- Religious

Miniatures

Animals

Bowls

Cups and saucers

Decorated tile

Doll dinnerware

Fantasy objects

Figurines

Fish

Hats

Model furniture

Mugs

Pitchers

Salt and pepper sets



Shoes

Urns

Vases

Pins and earrings

Abstractions

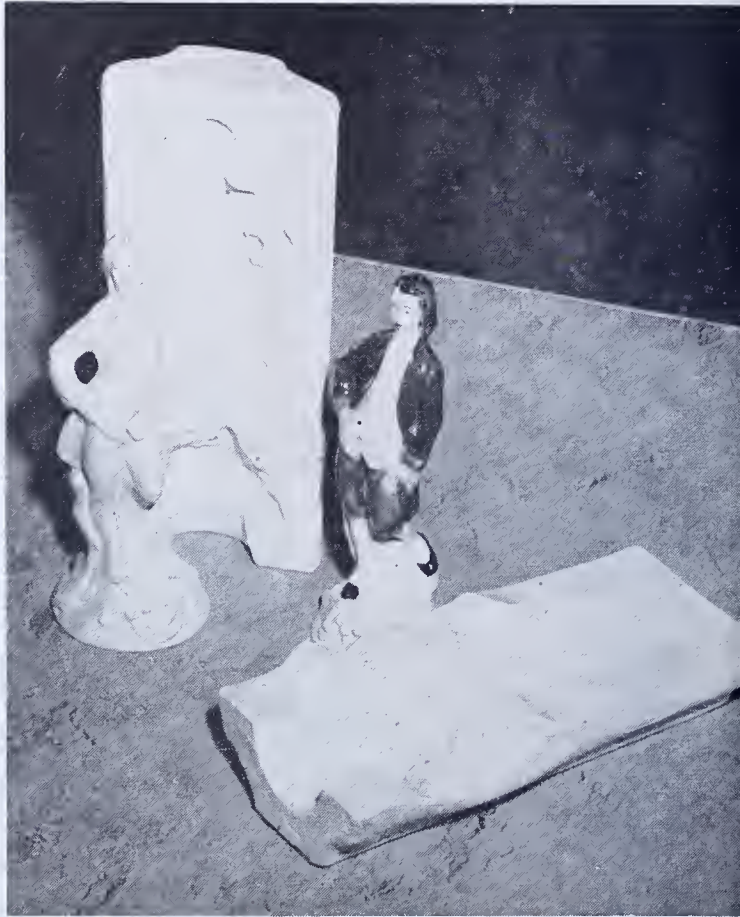


Day—Night



Lightning

Animals
Birds
Fish
First names
Flowers
Geometric forms
Monograms
Pixies
Sprites
Rings
Seal
Signet
Ceramic Sculpture
Abstractions
Animals
Fantasy figures
Brownies
Dragons
Elves
Fairies
Gnomes
Gremlins
Mermaids
Nymphs
Pixies
Witches
Human figures
Religious objects
Sculptured portraitures
Decorative tiles
Architectural tiles
Fancy tile for walls, fences,
chimneys
Fireplace facings
Coat of arms
Integrated tile
Monogram
Kitchen counter tops



Mosaic pattern motif for floors,
terraces, porches, sunrooms
Tea tiles
Tile facings
Vestibule floors
Wall switch plates
Window sills
Dinnerware
Cake plates
Celery dishes



Sky Bands

Buffalo Eye



Commemorative plates
 Anniversaries
 Birth announcements
 Birthdays
 Weddings
 Demitasse sets
 Dessert plates
 Fruit bowls
 Ice cream dishes
 Jam pots
 Relish dishes
 Salt and pepper sets
 Garden and floral pottery
 Architectural pottery
 Basic bowls
 Garden statuary
 Out-of-door pottery
 Lamps
 Dual purpose lamps



Lamp—ash tray
 Lamp—book ends
 Lamp—candy dish
 Lamp—cigarette holder
 Lamp—cut flower holder
 Lamp—flower planter
 Lamp—fruit dish

Plain lamp vases

General

Antique pottery reproductions
 Ash trays
 Caricatures
 Decals
 Geometric shapes
 Original designs
 Profiles

Buffalo Tracks



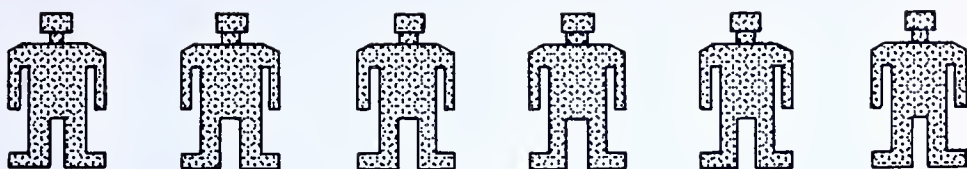
Boundary Line



- | | |
|--|----------------------------|
| Book ends | Ceramic signs |
| Calendar holders | Ceramic spice jars |
| Candle holders | Ceramic toothbrush holders |
| Card trays | Ceramic trivets |
| Ceramic bottles or carafes | Ceramic weather vanes |
| Ceramic birdhouses (wooden
bottom) | China clock decorations |
| Ceramic chess sets | Christmas decorations |
| Ceramic coffeemakers | Angels with candles |
| Ceramic door knobs | Candle holders |
| Ceramic drawer pulls | Choir boys |
| Ceramic lanterns | Nativity scenes |
| Ceramic lawn signs | Santas |
| Ceramic mail boxes | Tree ornaments |
| Ceramic serving spoons for
kitchen table or stove top | Cigar boxes |
| | Clay pipes |
| | Coasters |



Village



Man

Comic characters
 Cookie crocks
 Cookie plates
 Dessert molds
 Dishes for scouring pads
 Earring racks
 Feeding dishes for pets
 Flower frogs
 Flower pots and planters
 Humidors
 Ice cube buckets (handle of
 reed, rope, or raffia)
 Inkwells
 Jam pots and ceramic spoons
 Jumbo-sized coffee cups and
 saucers
 Lighter holders
 Nest of serving dishes
 Nest of mixing bowls
 Nursery rhyme characters
 Paper clip boxes
 Paper weights

Pen holders
 Perfume bottles
 Personalized cereal bowls and
 milk mugs
 Piggy banks
 Pipe racks
 Pitchers to keep drinks cool
 Pottery andirons
 Pottery fruit
 Pottery picture frames
 Pottery warming stoves for
 keeping coffee hot
 Powder boxes
 Range boxes
 Refrigerator dishes
 Ring boxes
 Soap dishes
 Stamp dispensers
 Sugar and creamer sets
 Teapots
 Trays for bobby pins



Tepee



Unit B: Keene Cement Articles

Ash trays	Fruit bowls	Marble wall panelings
Book ends	Jewelry boxes	Pen and pencil trays
Candlesticks	Lamp bases	Penholders

Unit C: Concrete and Masonry



Boat anchors
 Book ends
 Brick barbecue grills
 Bulb dishes
 Cement tiles
 Colored cement and concrete relief
 Incised and concrete-backed
 Plain cement
 Christmas tree bases
 Cinder block incinerators
 Clothesline posts
 Cold frames
 Concrete birdbaths (see page 2)
 Concrete flower boxes (see page 37)
 Concrete flowerpots
 Concrete lawn rollers
 Concrete stepping stones (see page 12)
 Concrete sun dials
 Concrete urns Fence posts
 Concrete walks Home plates



Hotbeds
House numbers
Lampposts
Lawn decorations
Mailbox posts

Outdoor fireplaces
Park benches
Patio flagstones
Sandbox toys
Tea tiles

Unit D: Metal Enameled Articles

Ash trays
Bobby pin boxes
Bowls
Candy dishes
Card trays
Cigarette boxes

Costume jewelry
Lamps
Light switch plates
Serving trays
Wastebaskets

Unit E: Glass

General

Designs on glass doors, bowls,
bottles, glasses, mirrors
Fire screens
Glass chimes
Glass shelves
Glass straws
Hanging flowerpots
Monogram plates
Mosaic glass panels

Mosaic glass trays
Night lamps
Photograph frames
Picture glass
Push plates
Serving trays
Stained glass
Stationery holders
Window glass



Use of Records, Forms, and Charts

The Industrial Arts teacher of a comprehensive shop program is confronted with many problems pertaining to the administration of the program, details of instruction, and the handling of supplies. The problems increase as the activities in the shop become more diversified. Development of adequate record-keeping forms and charts, and the maintenance of accurate up-to-date records are an important responsibility of the Industrial Arts teacher. If properly developed, record-keeping will not be time-consuming and monotonous, but will aid the teacher in showing daily teacher-pupil progress. Such records should also prove useful in the evaluation, development, and improvement of the instructional program. Care should be taken, however, that the teacher does not become so involved with record-keeping that he becomes a mere clerk. Instead, a plan can be devised whereby pupils and teacher share the work of recording pupil progress in the learning units.

THE CUMULATIVE PROJECT RECORD CARD

The Cumulative Project Record Card is a convenient device for keeping an organized record of each pupil's progress and his experi-

Name	Grade	7	8	9	10	11	12	PG
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Industrial Arts Department School _____ City _____

[illegible]

PROGRESS CHART

39

Course _____

PROGRESS CHART

Grade _____

Semester _____

Year _____

Section _____

Days _____

Periods _____

Information Units

JOBS

Pupils' Names

	Information Units					JOBS				

Sample Progress Chart to Show Accomplishment of Pupils Throughout the School Year

same extent. Therefore, a record of each pupil's accomplishment is needed for day-by-day assignments, term scheduling, and later reference. A suggested progress chart is shown above.

Instructional Materials

When shopwork was first introduced into the public schools, teachers felt that it provided a means of escape from the "drudgery" of books. Because of this fact, very little use was made of written instructional materials in the teaching of Industrial Arts. In recent years, however, since interest in the comprehensive general shop has increased, instructors are aware that the necessary instruction of a multi-activity shop can be taught most effectively through the use of instruction sheets. Written instruction sheets are of great value in giving specific directions quickly to the pupil or to a group who have different backgrounds, interests, and abilities.

INSTRUCTION SHEETS: Instruction sheets are particularly helpful in giving individual instruction where pupils progress independently at their own speed. Some advantages in using written instructional material are:

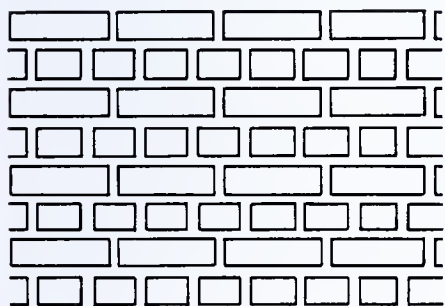
1. The teacher has more time to select instructional material and to arrange it in the best learning order
2. More accurate instructions are possible
3. The responsibility to seek out information is placed on the student
4. Accurate record-keeping and checking can be carried on easily
5. The teacher has more time for helping individual pupils

Procedures and Techniques

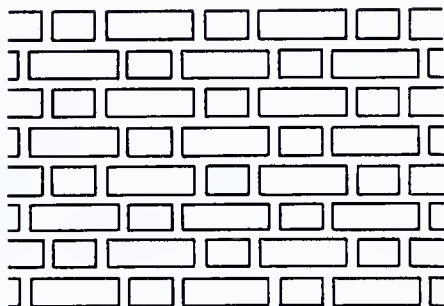
It is important to get pupils started in the right manner. The objectives, methods, procedures, and teaching devices must be planned and explained so as to emphasize that the shop is a place to learn things as well as to make things. Teaching does not consist primarily of telling and showing but rather in providing shop experiences which interest the pupils and create the desire to learn.

The practical and informational learning units in Ceramics are comprehensive, providing experiences in all areas ranging from the simple to the complex. Considerable flexibility exists in content. Chapter 2—Learning Units—provides a basis for selection of units of instruction most applicable to the needs and interests of the group, or the individual pupil.

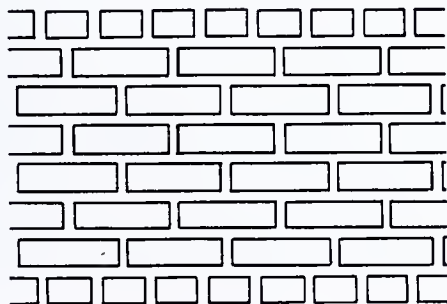
Success in teaching Ceramics as an Industrial Arts activity depends largely on proper planning of instruction and the development of instructional materials, such as information sheet, page 42, operation sheet, page 43, and sample pupil project assignment sheets, pages 45 to 60.



Double Flemish Cross Bond



Flemish Bond



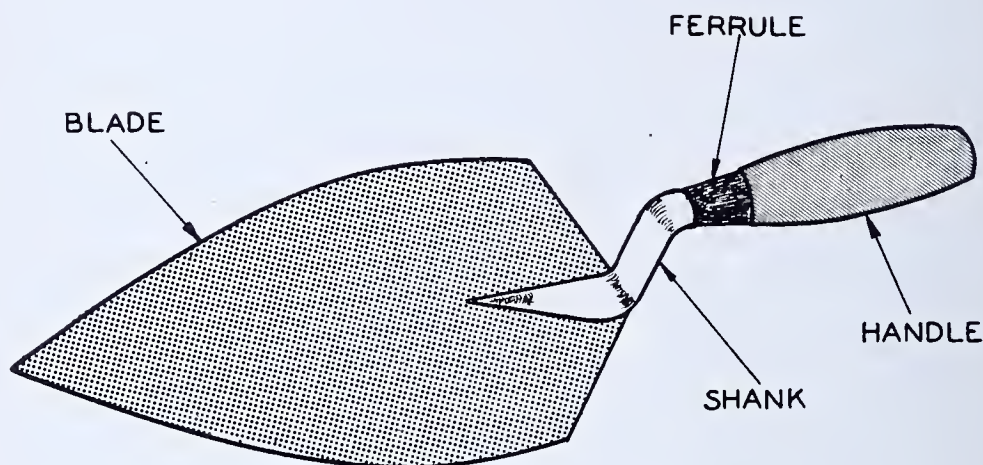
Common American Bond

SAMPLE PUPIL INFORMATION SHEET

UNIT: CONCRETE AND MASONRY

TOPIC: BRICKLAYER'S TROWEL

REFERENCES: Dalzell and Townsend, *Masonry Simplified*. p. 269
J. Edgar Ray, *The Art of Bricklaying*. p. 52



Description, Use, and Care of the Bricklayer's Trowel

1. The trowel should be of medium size and should fit the user so that there is no strain on the wrist but a feeling of comfort in the spreading process.
2. The trowel should always be kept clean. It will be easier to use and it will spread the mortar in a neater fashion.
3. Always take a full load when picking up the mortar with a trowel, but do not overload the trowel.
4. When cutting off excess mortar, always cut with the tip of the trowel and strike cross joints with the tip. Cut the joint, do not scrape it off. The trowel should be turned to a 45° angle to the face of the wall.
5. The trowel handle is used lightly in tapping brick into a plumb position.
6. The trowel is used to pick up mortar from the mortarboard for transfer onto the wall. The trowel should be held firmly and fully grasped with the right hand, yet not too tightly, and should be controlled by the muscles of the fingers, wrist, and arm, so that it may be rolled between the thumb and the forefinger to any desired position.

7. The thumb should not go around the handle, but should rest on top of it—the first two fingers bearing most of the weight of the trowel.

8. The shank and ferrule should be kept clean of the mortar while in use, because contact of the forefinger with the mortar will hinder the worker and may cause a sore finger.

9. Mortar should be picked up from the mortarboard in such a manner as to keep the mortarboard clean.

10. Keep the mortar in a neat pile on the mortarboard.

11. A right-handed bricklayer should spread mortar from his left to his right.

12. A left-handed bricklayer should spread mortar from his right to his left.

QUESTIONS:

1. How much mortar should be picked up with the trowel?
2. Why should the shank and ferrule be kept clean at all times?
3. Are all trowels the same size?

SAMPLE PUPIL OPERATION SHEET

UNIT: GLASSWORKING

OPERATION: HOW TO DRILL A HOLE IN GLASS

OBJECTIVE: In order to use glass more extensively in school projects, a method of fastening pieces together is essential. Drilling holes in glass can be a simple procedure when the following steps are considered carefully.

PROCEDURE FOR PREPARING DRILL:

1. Select an old triangular file. (The size of the file will determine the size of the holes that can be drilled.)
2. Place the file in the vise and allow $2\frac{1}{2}$ " to 3" to extend beyond the jaws of the vise.
3. Strike the file with a mallet close to the jaws of the vise. The file will break off at this point.

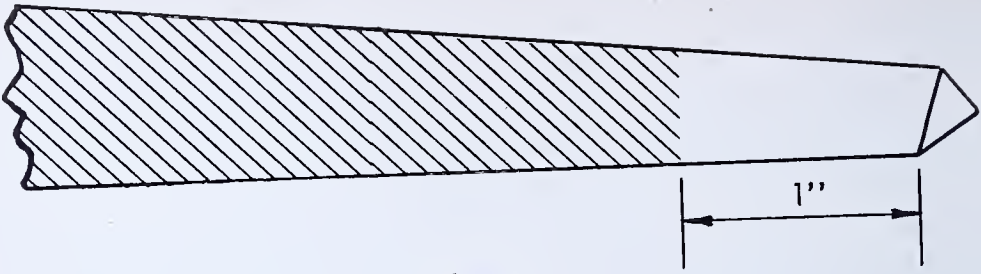


Figure 1

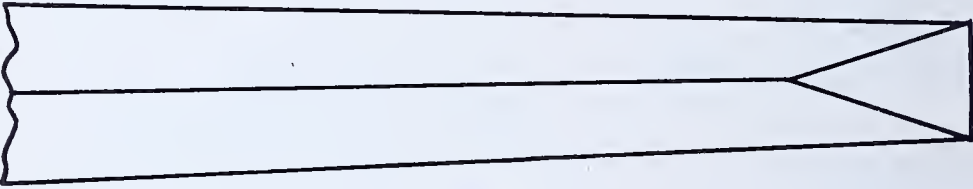


Figure 2

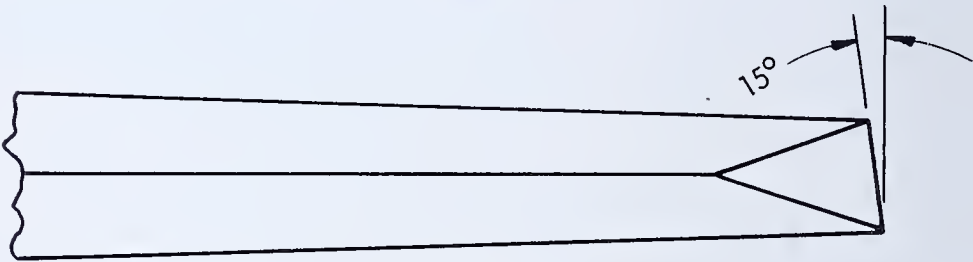


Figure 3

4. Grind off the sharp points of the newly broken end.
5. Grind off the file teeth for a distance of about 1" from the point. See figure 1.
6. Grind the back of the file so that it forms a point like a chisel. See figure 2.
7. Grind the chisel edge so that it has a rake of 15 degrees. See figure 3.
8. Sharpen raked edge. (Drill should be whetted after each hole is drilled.)

PROCEDURE FOR DRILLING A HOLE:

1. Place the drill in a bit brace.
2. Locate the position of the holes to be drilled in a piece of paper the same size as the glass.
3. Place the paper under the glass in position so that the holes can be seen.

4. Place a few drops of turpentine where the hole is to be drilled. A dam of modeling clay or wax may be made and filled with turpentine.
5. Place drill in position and turn brace slowly using little pressure.
6. Apply turpentine several times if a retaining ring of clay is not used.
7. When the point of the drill penetrates the glass, turn it over and finish drilling the hole from that side. This procedure will prevent the glass from chipping.

SAMPLE PUPIL PROJECT ASSIGNMENT SHEET—A

UNIT: KEENE CEMENT

PROJECT NO. 6: MAKING AN ASH TRAY

OBJECTIVE: To make a useful article for the home which involves the making of a form or mold, the mixing of mineral colors, casting, and finishing.

MATERIAL REQUIRED:

A piece of thin sheet metal, 1" x 24" (may be cut in two pieces for shaping)

A piece of wood 1" x 7" x 7"

A plug 3½" in diameter and ½" thick (may be wooden, a metal disk, or a cast piece of plaster of Paris)

Mineral color

Finishing nails, 1½" long

Oil for the form and plug (If a plaster of Paris plug is used, it must be painted with shellac)

Keene cement

Wooden dowel ⅜" in diameter

Polishing materials

Sandpaper

TOOLS REQUIRED:

Tin snips

Plane

Hammer

Buffer

Mixing pan and paddle

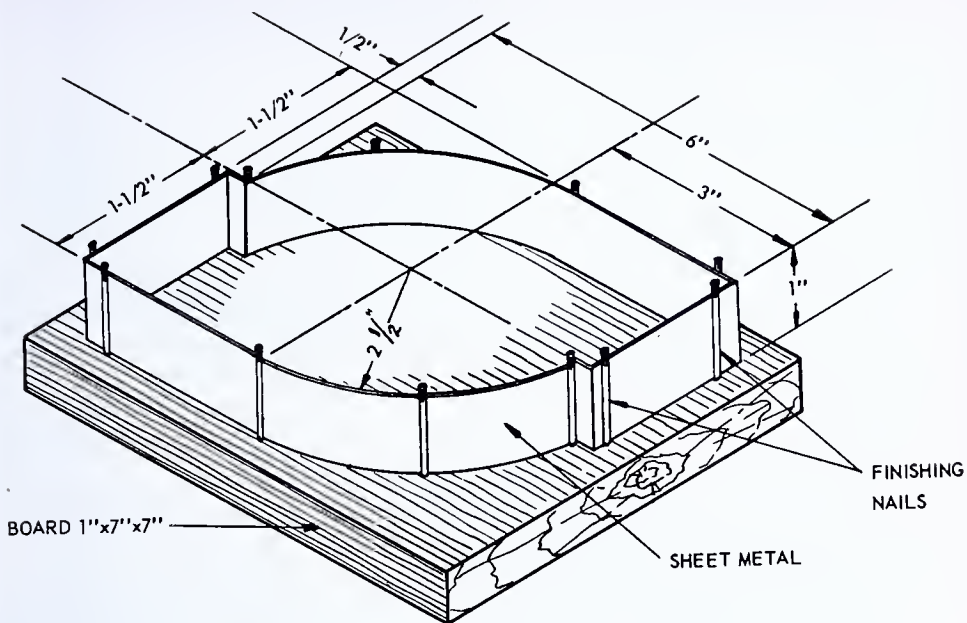
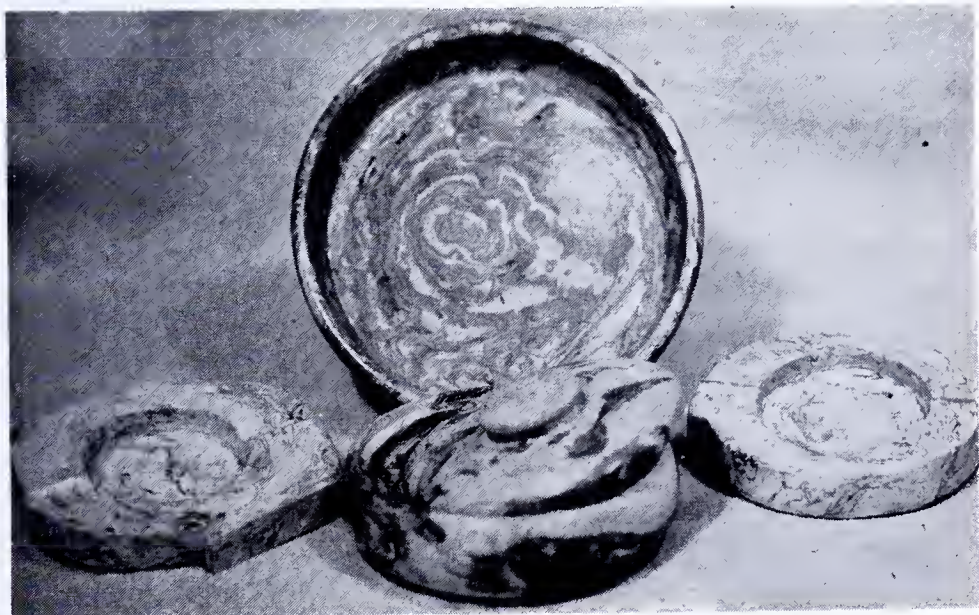


Figure 2

10. Draw a line around the sides of the casting, measuring down 1" from the top.
11. Plane off excess cement to the line.
12. Lay out the groove for the cigarette. See figure 1, page 46.
13. Wrap a dowel with sandpaper and cut grooves $\frac{1}{4}$ " deep as marked.
14. Polish cast piece.



SAMPLE PUPIL PROJECT ASSIGNMENT SHEET—B

UNIT: CONCRETE AND MASONRY

PROJECT No. 1: A 4" BLOCK PIER— $19\frac{3}{4}"$ x $19\frac{3}{4}"$

OBJECTIVE: To build a concrete block pier, square, level, and plumb. The use of concrete blocks in building a wide variety of structures has increased tremendously in recent years. Contributing to the vast popularity of this readily available material is its low cost and the speed with which it can be used in erecting a structure. See figure below.

MATERIAL REQUIRED:

4" Concrete Blocks (4" x 8" x 16")

Lime mortar*

For shop use mix 1 part hydrated lime to 2 parts Jersey sand

TOOLS REQUIRED:

Steel square

6' zigzag rule

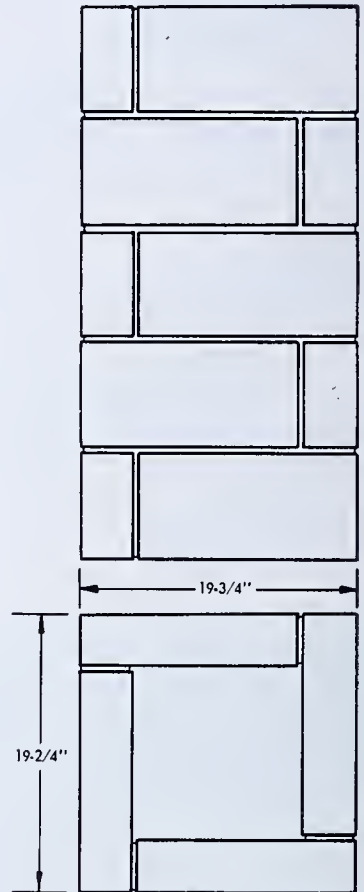
Concave striking iron

Bricklayer's trowel

Pointing trowel

Level, 4' long

Dusting brush



PROCEDURE:

1. Assemble required tools.
2. Prepare mortar.*
3. Lay out trial job, square, and mark.
4. Lay first course 8" high, square, level, and plumb.

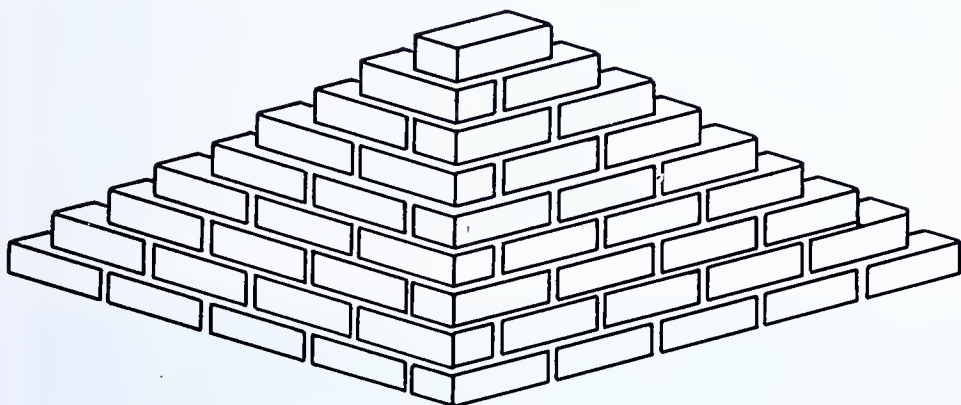
* Lime mortar is usually used in project assignments remaining in the shop.

5. Make following courses 8" high, level, and plumb.
6. Cut off excess mortar after each block is laid.
7. Lay blocks with small openings on top.*
8. Make joints full, cut off mortar both inside and outside of pier.
9. Strike all joints to insure weather proofing.
10. Dust off blocks to remove burrs from pier.

SAMPLE PUPIL PROJECT ASSIGNMENT SHEET—C

UNIT: CONCRETE AND MASONRY

PROJECT No. 2: A 4" OUTSIDE CORNER (COMMON BOND)



OBJECTIVE: Outside corners can be found in every brick building, in piers, and in brick chimneys. This project is planned to give experience in laying a 90° outside corner with a steel square, and to make it plumb, level, and straight. See figure above.

MATERIAL REQUIRED:

†Lime mortar. Mix 1 part hydrated lime and 2 parts Jersey sand
Bricks—optional (common brick preferred)

‡Cement mortar. Mix 1 part mortar cement and 2 parts Jersey sand

Vinegar containing 5% acetic acid. (For cleaning brick work)

TOOLS REQUIRED:

In general all bricklaying tools are hand tools. The hand tools needed for this job are:

Bricklayer's trowel

Concave striking iron

* Concrete blocks have small openings on top and large openings on bottom.

† Lime mortar is usually used in project assignments remaining in the shop.

‡ Cement mortar is usually used for permanent jobs.

Steel square

Pointing trowel

Level, 4' long

Dusting brush

Bricklaying gauge No. 6—4 courses equal 11 inches

PROCEDURE:

1. Assemble required tools.
2. Prepare mortar.
3. Lay the project out dry; square and mark spacing of cross joints.
4. Lay corner bricks first and tailing bricks last.
5. Square, plumb, and level first course.
6. Plumb, level, and gauge each course thereafter.
7. Follow bond and keep joints uniform.
8. Strike joints when mortar is dry enough to hold its shape.
9. Use brush to dust burrs from wall.



SAMPLE PUPIL PROJECT ASSIGNMENT SHEET—D

UNIT: CONCRETE AND MASONRY

PROJECT No. 3: SMALL OUTDOOR FIREPLACE (See page 52)

OBJECTIVE: To build a useful brick job containing many phases of brick work such as piers, arches, corbeling, and racking. (See page 52)

MATERIAL REQUIRED:

*Lime mortar for shop use. Mix 1 part hydrated lime and 2 parts Jersey sand.

2 Iron grates (1 solid and 1 perforated) 20" x 17½"

8" Brick—optional (common preferred)

**6" Brick (Cut pieces)

**4" Brick (Cut pieces)

TOOLS REQUIRED:

Brick-cutting chisel

Bricklayer's trowel

Concave striking iron

Steel square

Brick hammer

Pointing trowel

Level, 4' long

Dusting brush

Gauge No. 6—4 courses equal 11 inches

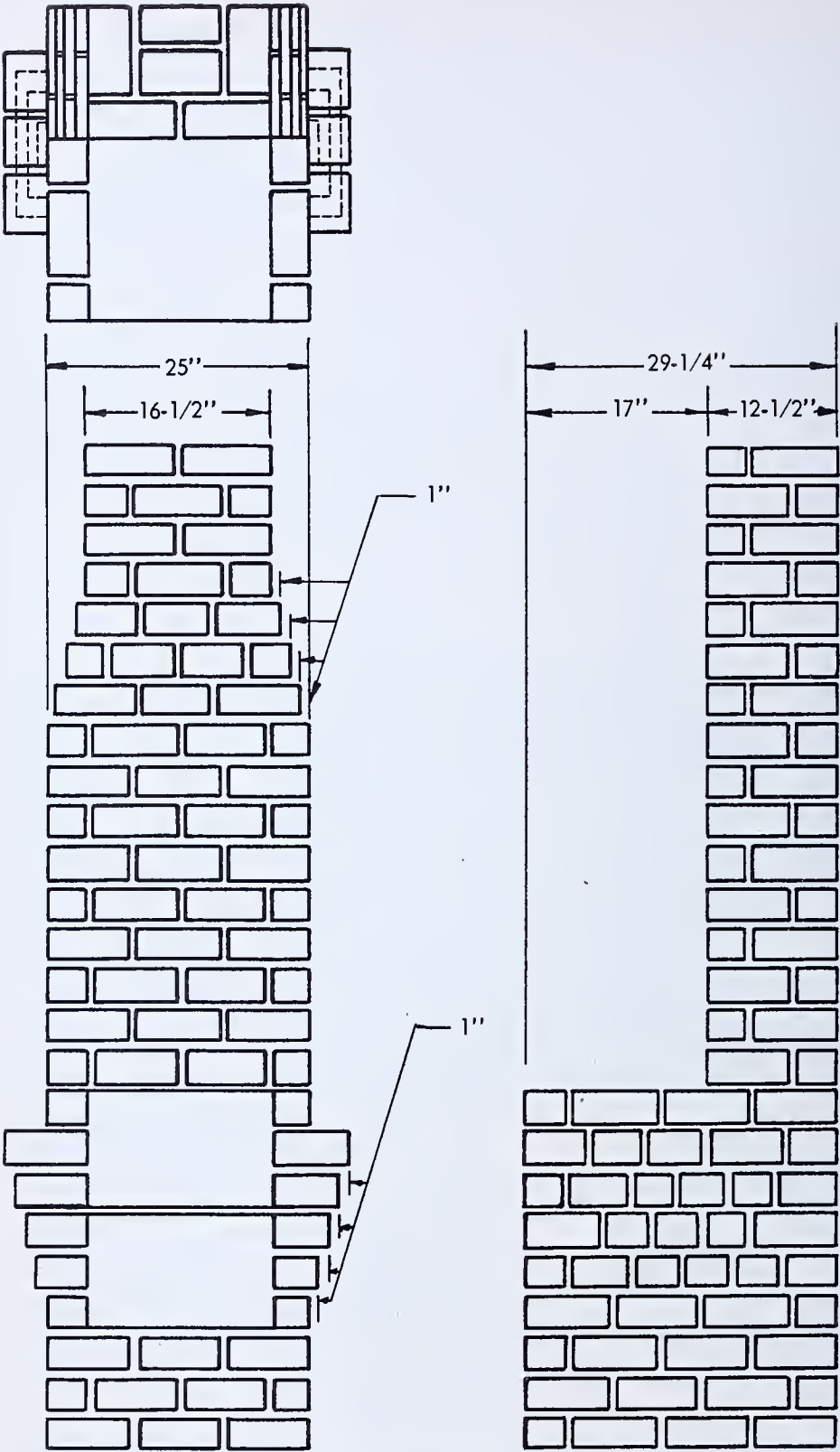
Vinegar containing 5% acetic acid (for cleaning brickwork)

PROCEDURE:

1. Assemble required tools.
2. Prepare mortar and place mortarboard 2 feet from place where project is to be erected.
3. Lay out trial job and mark it on the floor.
4. Cut pieces required for the fireplace.
5. Use a flat arch when building chimney over firebox.
6. Corbel and rack according to plans, using a 1-inch gauge.
7. Lay a 3-course base.
8. Base may be filled.

* Lime mortar is usually used in project assignments remaining in the shop.

** Pieces may be cut in shop from whole or chipped bricks.



Plan for Small Outdoor Fireplace (page 51)

SAMPLE PUPIL PROJECT ASSIGNMENT SHEET—E

UNIT: CONCRETE AND MASONRY

PROJECT NO. 25: CORINTHIAN-TYPE BOWL

OBJECTIVE: To obtain experience in the use of templates and gauges and to gain a knowledge of patent plasters and their use in ornamental plasterwork.

INFORMATION: Corinthian-type bowls are made of a patent gypsum plaster containing vermiculite and are used as interior ornaments. They can be used as ash trays (filled with sand), flower bowls, and fruit or nut bowls.

MATERIAL REQUIRED:

Cement, portland (if needed)

Paint, plaster ($\frac{1}{2}$ pint)

Plaster, gypsum, containing vermiculite (2 gallons)

Sandpaper, No. 00

Wax paper

Wire, $\frac{1}{4}$ " mesh (1 square foot)

TOOLS REQUIRED:

Brush, paint

Float, wood finger

Stone, fine

Sweep

Inside

Outside

Trowel, steel

PROCEDURE:

1. Assemble all tools, equipment, and materials.
2. Place precast plaster, clay, or papermade core on disc. See figure 1, page 54.
3. Cover the core with wax paper, tucking the ends under the core.
4. Insert axis rod in hole in center of core and place outside sweep in position (base of bowl to top). See upper half of figure 2, page 55.
5. Mix 1 gallon of any patent gypsum plaster containing vermiculite (use fairly stiff mixture).
6. Trowel 1" of plaster on the core (allow to set for approximately 20 minutes).

Bend outward to form curve of bowl.

Roll on round piece of pipe or wood
to get shape.

Wire 6" disc firmly to bottom of stem.

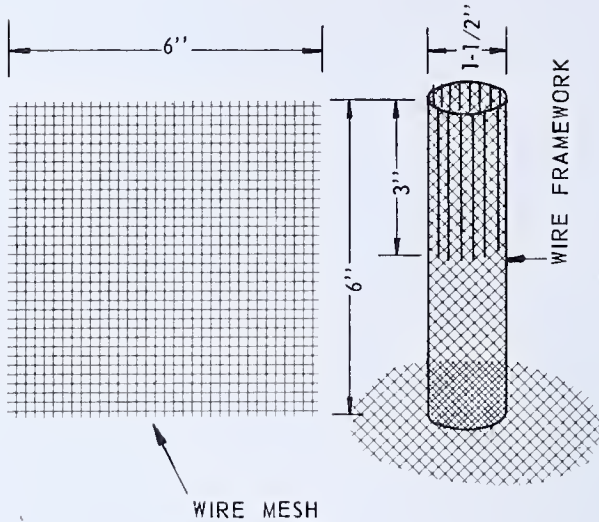


Figure 1

7. Make a wire mesh framework for stem and base of bowl. See figure 1, above.
8. Install wire mesh.
9. Trowel a stiff mix of plaster over and through wire framework (check to see that wire mesh is imbedded thoroughly in the plaster).
10. Fill in plaster to the edge of the sweep. Use the sweep in a firm circular motion.
11. Remove sweep.
12. Cover bowl with a damp cloth and allow to set over night.
13. Turn bowl over on base and remove core. (It may be necessary to cut around the top of the core to release.)
14. Remove wax paper from inside the bowl and rough up the surface.
15. Place axis rod and inside sweep in position.
16. Trowel plaster on the inside of the bowl and true with sweep. See figure 2, lower half, page 55 and pictures on page 56.
17. While inside plaster is setting, finish outside of bowl by rubbing with a fine stone or wood finger float, brushing on water as needed.
18. Finish inside of bowl when it has set hard.
19. Wash entire bowl with water to remove loose material; allow it to dry thoroughly.

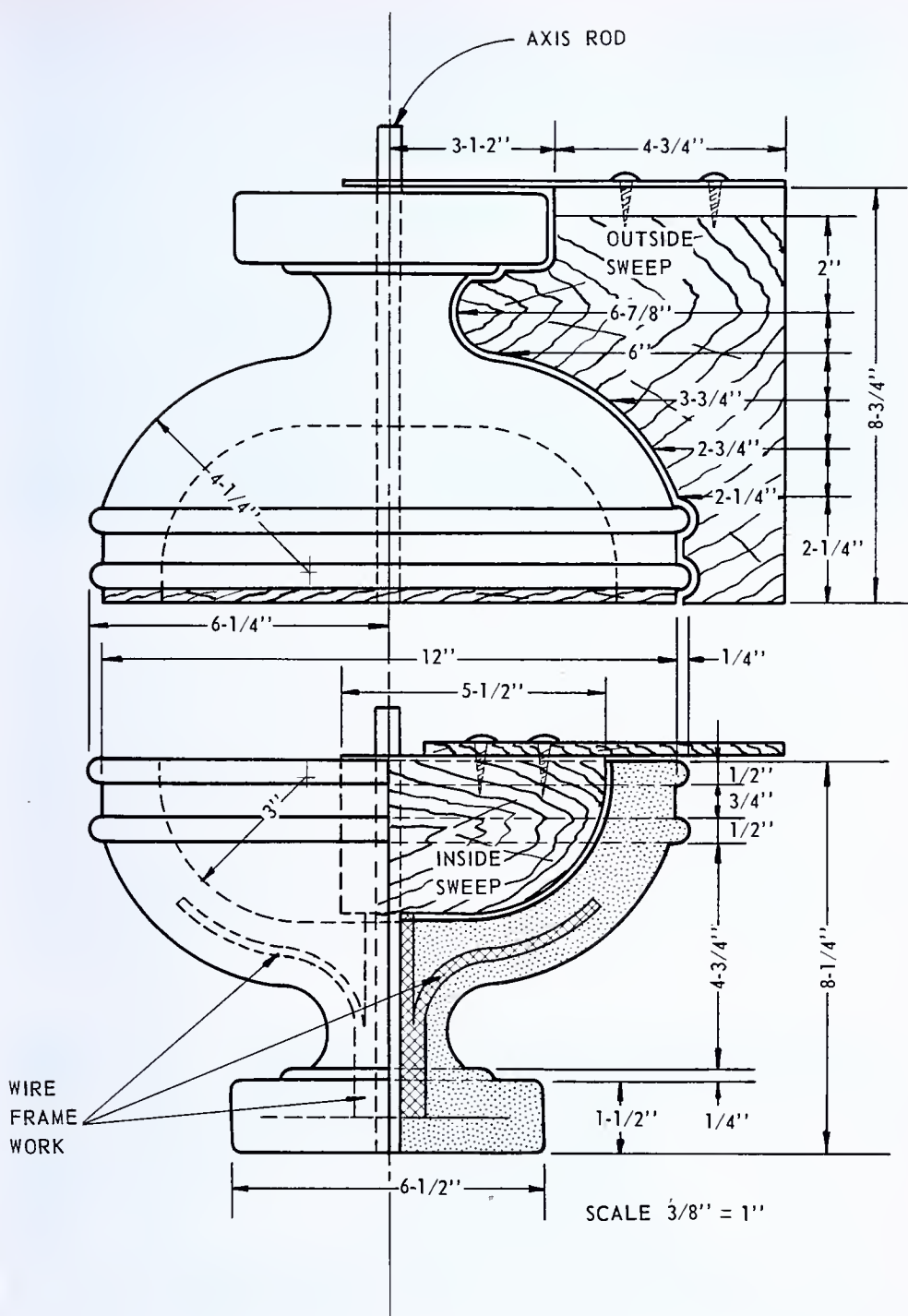


Figure 2

20. Sand lightly with fine sandpaper (No. 00) and touch up any imperfections.
21. Paint with any good commercial plaster paint.



NOTE:

1. Clean and repair sweeps, templates, and gauges before storing.
2. Metal gauges can be made to check trueness of bowl contours.
3. Room temperatures affect setting time of plaster and will govern the length of time in construction. The plaster must not be applied faster than it will hold its shape on the bowl. About 1 per cent portland cement can be added as an accelerator. If setting is too fast use a small portion of cream of tartar.
4. Care must be exercised not to get any dry or wet plaster into the eyes as a burn will result. In case of accident, bathe the eyes in a watered solution of vinegar or weak solution of lemon juice. Send for medical aid immediately.



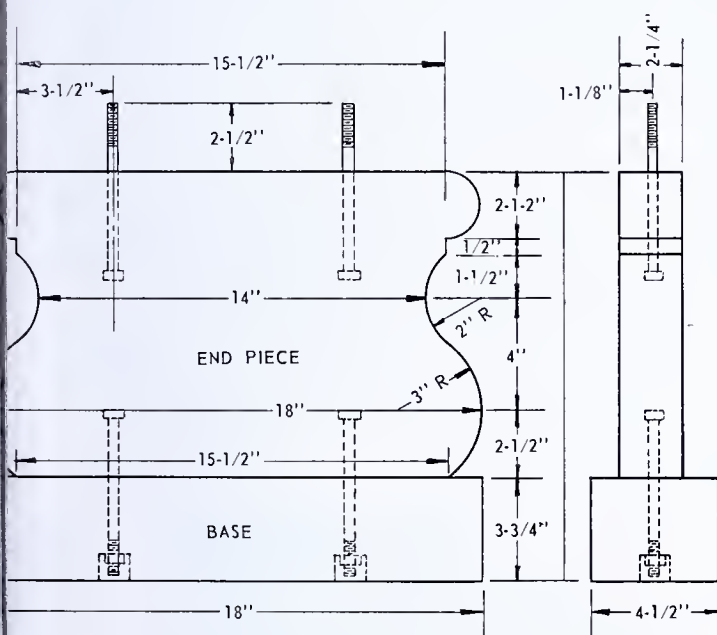
SAMPLE PUPIL PROJECT ASSIGNMENT SHEET—F

UNIT: CONCRETE AND MASONRY

PROJECT NO. 28: CONCRETE COLONIAL BENCH

OBJECTIVE: To gain knowledge and experience in mixing, placing, reinforcing, curing, and finishing concrete and to learn how to prepare and care for forms used in making projects of concrete. See figures 1 and 2, below, and montage on page 60.

INFORMATION: The concrete bench is a type of outdoor furniture that usually remains outside all year. Due to the many changes in weather conditions it is subject to extreme stresses within the concrete mass; therefore, it is essential that great care be exercised in all phases of construction.



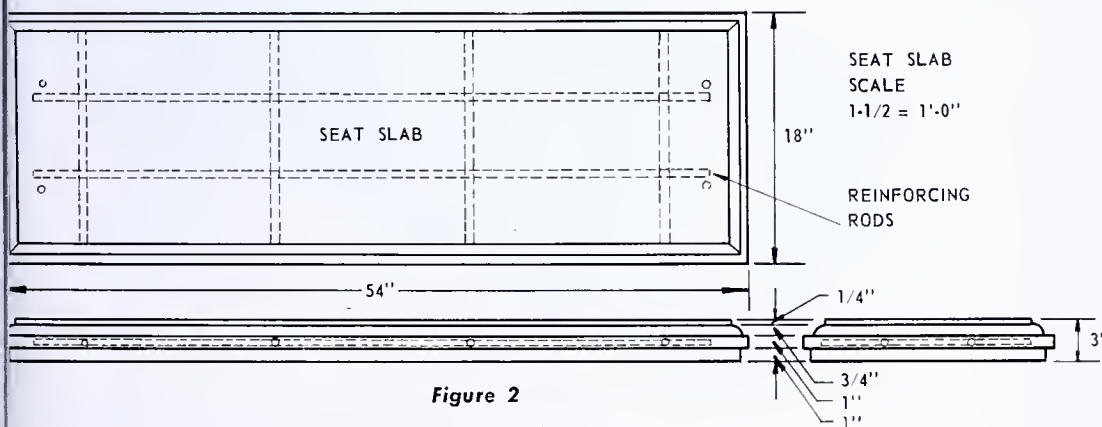
NOTE—The top slab, base, and bench ends are fastened together with 3/8" bolts and a thin grout of cement.

Cast bolts in top and bottom of end piece.

Ground pegs, 1/2" diameter, 2-1/2" long are cast in underside of top slab and removed to form holes to receive bolts on top of end piece.

BASE SCALE
3" = 1'-0"

Figure 1



SEAT SLAB SCALE
1-1/2" = 1'-0"

REINFORCING RODS

Figure 2

MATERIAL REQUIRED FOR:

Seat Slab

- 5 gal. Cement
- 4 pcs. Rod, reinforcing, $\frac{1}{2}$ " diameter x 16" long
- 4 pcs. Rod, reinforcing, $\frac{1}{2}$ " diameter x 50" long
- 4 gal. Sand, river
- 10 gal. Screenings
- Wax paper
- Wire

End Pieces

- 4 Bolts, $\frac{3}{8}$ " x 6"
- 2 gal. Cement
- 2 gal. Sand, river
- 3 gal. Screenings
- Wax paper

Bases

- 1 $\frac{1}{2}$ gal. Cement
- 1 gal. Sand, river
- 3 gal. Screenings
- Wax paper

TOOLS REQUIRED:

- Float, wood
- Mortar box
- Shovel
- Stone, carborundum, fine
- Straight edge, wood
- Trowel, steel

PROCEDURE FOR:

Seat Slab

1. Assemble all tools, materials, and equipment.
2. Check forms against the drawing and apply oil to form.
3. Place forms for seat slab upside down (top of seat down) on a level surface which has been covered with wax paper.
4. Mix concrete 1:3 cement-sand mix (3" slump test).
5. Trowel 2" cement-sand mix on bottom of slab form.
6. Place reinforcing rods and wire together where rods cross.
7. Trowel 1" cement-sand mix against sides of form.
8. Fill remainder of space with a concrete mix (1:3 cement-screenings).

9. Strike off concrete with a straight edge.
10. Place ground plugs in position.
11. Allow concrete to set for one-half hour and float with a wood float.
12. Finish with a steel trowel using a circular motion, after the concrete has set for approximately 2 hours.
13. Remove forms and finish the sides in the same manner as the top (step 12).
14. Cover with a wet cloth and keep the cloth moist in order to properly cure the seat slab (about 2 weeks' time is required).
15. Seat slab cannot be turned over for about 10 hours. Rub with a fine carborundum stone.
16. Dust with cement and finish with a steel trowel.

End Pieces and Bases

1. Follow the same procedure as for the seat slab except that reinforcing rods are not necessary.
2. Align bolts carefully in place through the holes in top and bottom of end form.
3. Base pieces must have holes drilled to receive bolts in bottom of end pieces when concrete has set approximately 8 hours.
4. Countersink holes to allow for nut.

NOTE:

All forms should be cleaned and oiled upon completion of assignment.





OUTDOOR COLONIAL BENCH

Upper Left: Shellacking form for base of end piece.

Upper Right: Removing form from end piece.

Middle Left: Finishing end piece.

Lower Right: Troweling bench top.

Lower Left: Finishing edge of bench top.

Shop Management Organization

As the activities presented in industrial arts shops are increased in number and scope, it is expedient for the teacher to assign some of the routine duties to pupils. The purpose and the plan itself will not be the same for all schools, depending on the activities offered, size of class, age of students, length of periods, and physical layout of the shop. This cooperative plan is an effective device for achieving the following common industrial arts objectives:

1. To present practice in leadership and "followership"
2. To motivate the pupils' understanding of industrial operations and applications
3. To develop responsibility and a feeling of belonging to the activity
4. To aid the teacher in many routine duties

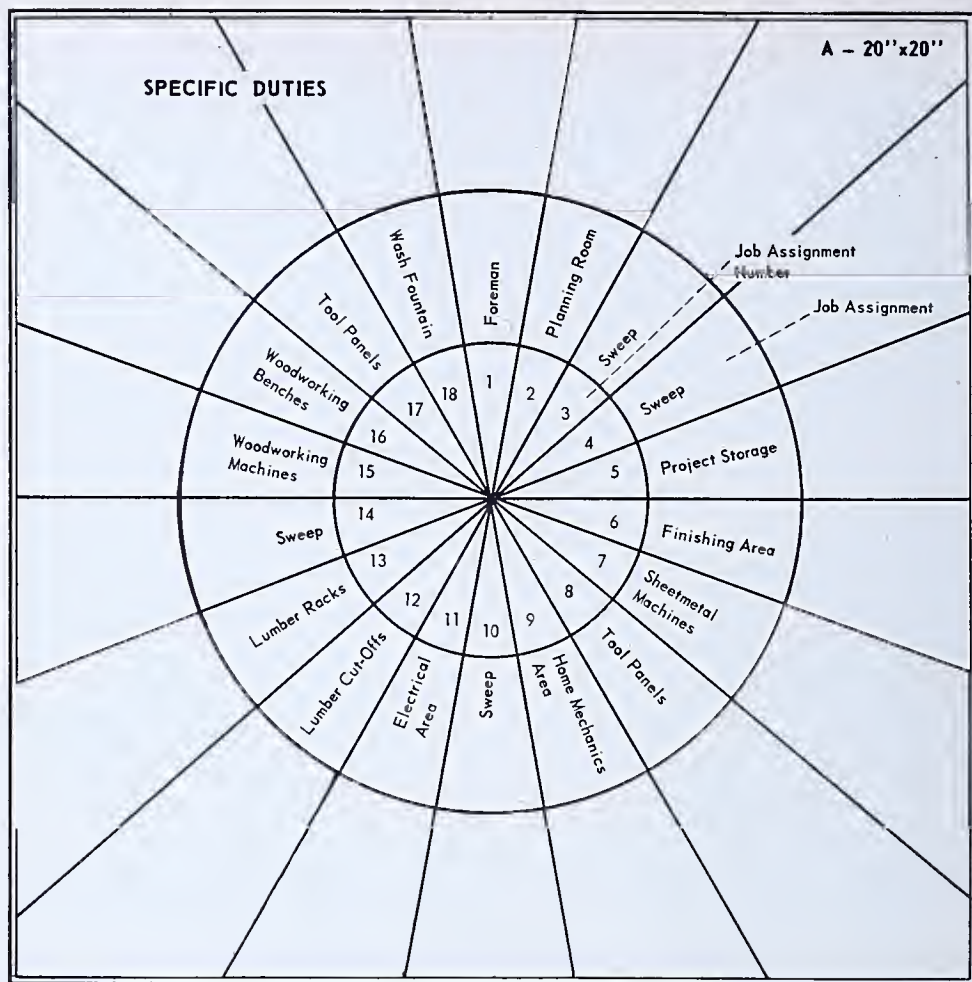
The shop management activities should be planned and organized by the class. A teacher-imposed plan is readily recognized by the pupils, and has a tendency to destroy pupil interest. Better cooperation can be developed, therefore, through a personnel plan developed by the pupils with teacher guidance and direction. Pupils may assist in the development of the plan as a class or through a committee of pupils from several classes. A plan developed in this manner motivates the pupils' interest in industrial personnel organization and provides an incentive for the study of local plant personnel systems. The added cooperation attained by the teacher, and the guidance value received by the pupils more than compensate for the extra time spent in the democratic development of this plan.

In order to make a pupil shop management plan operate successfully, the importance, need, and practicability must be explained carefully to the pupils. The success of the program depends entirely upon the pupils' acceptance; therefore, the teacher should plan his presentation carefully in order to justify the value and need for such a program.

The shop management plan on page 62 illustrates an excellent, workable, and easily constructed device which may be adapted to many different school-shop situations.

Construction Suggestions

1. Construct a panel from two pieces of $\frac{1}{4}$ " plywood. One piece (A) to be 20" x 20" and a circular piece in the center 6" in diameter. Both pieces should be shellacked or painted and



Suggested Device for Shop-Management Organization

lines drawn as shown on figure above. The circular disc in the center is fastened to the main panel so that it can be rotated

2. Divide the 6'' center circle and the 20'' x 20'' square (A) into 12, 16, 18, or any number of segments that best fit a specific situation.
3. Determine job assignments and list them as shown on the 20'' x 20'' panel of the above chart. Draw a circle to separate job assignments from specific duties.
4. Determine specific duties involved in each job assignment. These may be typed on pieces of paper and pasted in the designated section as shown on the chart.

5. Numbers are assigned to each student to correspond to numbers on the 6" job assignment wheel in the center.
6. The numbered disc at center is rotated one position periodically so that pupils work through all clean-up jobs.
7. *Example:* The student having job assignment No. 15 will have the job assignment, Woodworking Machines, which in turn includes certain specific duties which might be: (1) dusting off woodworking machines with brush, (2) brushing floor under machines, (3) putting all accessory tools in place.

A Partial Check List on Care of Ceramics Area

This check list may serve as a guide to the teacher in keeping the Ceramics Area functioning in good order.

	YES	NO
1. Is there a place for everything and everything in its place?	_____	_____
2. Are the tools clean, easy to get and put away efficiently, and attractively arranged on tool panels in the activity area?	_____	_____
3. Is the Ceramics activity equipment well arranged from the standpoint of efficiency and safety?	_____	_____
4. Are all the commonly used tools, supplies, and other pieces of equipment required for working in this area located in the activity area?	_____	_____
5. Are the dry clays stored conveniently and in such a manner as to avoid confusion?	_____	_____
6. Is the clay slip stored conveniently and is it properly covered?	_____	_____
7. Has adequate storage been provided for sand, lime, cement, etc.?	_____	_____
8. Can tools used in masonry and concrete work be conveniently washed and cleaned when not in use?	_____	_____
9. Is water convenient to this area?	_____	_____



4 *Instructional Aids*

BOOKS, MAGAZINES, TRADE PUBLICATIONS, FILMS AND FILMSTRIPS

IN A BULLETIN of this size, it is impossible to list all available materials in the form of books, pamphlets, charts, catalogs, and magazines. However, an attempt has been made to list some reference materials with publisher, date, number of pages, and author. Wherever possible, an annotation of the contents is given for the convenience of teachers.

BOOKS

Bates, Kenneth F., *Enameling—Principles and Practice*. Cleveland, Ohio and New York City, The World Publishing Company, 1951. 208 pp. \$3.75.

This book, by an outstanding contemporary enameler, describes all of the techniques and processes in metal enameling. Special emphasis is given to the fine art aspects of this craft. Encourages development of creative design and includes many illustrations.

Binns, C. F., *The Potter's Craft*. Third Edition. 250 Fourth Avenue, New York 3, D. Van Nostrand Company, Inc., 1947. 228 pp. \$2.80.

A standard handbook on pottery, porcelain, mold-making, plaster casting, and glazing.

Bradley, Charles B., *Design in the Industrial Arts*. Peoria 3, Illinois, Charles A. Bennett Company, Inc., 1946. 254 pp. \$4.00.

A new approach to problems of art and design as applied to handicrafts and the selection of manufactured articles for daily use. Principles of functional design, of color, and of emotional or traditional art values are explained and used to weigh qualities in decoration and construction.

Briggs, Howard L., and Carver, William, *Practical Bricklaying*. New York City, McGraw-Hill Book Company, Inc., 1924. 223 pp. \$2.20.

Explains the basic tools and processes in bricklaying.

Carls, E. W., and Wines, L. G., *The Art of Tile Setting*. Peoria 3, Illinois, Charles A. Bennett Company, Inc., 1954. 224 pp.

Designed for both professional and amateur, this book emphasizes techniques which lend themselves to self-teaching. Includes detailed instructions for installation of each material.

Christensen, Erwin O., *Ceramics: Early American Designs*. 2 West 45th Street, New York 36, Pitman Publishing Corporation, 1952. 48 pp. \$1.75.

A selection of ceramic decorations from collections of original early American folk art, reproduced by courtesy of the National Gallery of Art in Washington, D. C. Some sample motifs are outlined in the clay, and at times filled in with color. In others, lines and dots are applied in slip, or leaf and floral motifs are incised through glass to reveal the red color of the earthenware. Illustrations are included to aid the designer interested in this field.

Cole, Richard D., and Starr, Peg B., *Making Pottery for Profit*. New York 10, Sterling Publishing Company, Inc., 1951. 187 pp. \$2.95.

Contains hundreds of moneymaking ideas with step-by-step directions for making ceramics pay. Tells what to make, how to make it, and how to merchandise it. Includes ideas for new and original ceramic products. Useful to instructors as a source of ideas for shop projects.

Curtis, Edmund deForest, *Pottery: Its Craftsmanship and Its Appreciation*. 49 East 33rd Street, New York 16, Harper and Brothers, 1940. 100 pp. \$2.50.

A manual of the latest methods, formulas, and techniques for preparing clays of all types for all purposes, for forming, drying, glazing, and firing useful and artistically designed products. Includes instructions on how to make stoneware and earthenware and how to remedy trouble that develops before and during firing. Links the fine pieces of the past with materials and processes in use today.

Dalzell, J. R., and Townsend, G., *Masonry Simplified—Volume I—With Study Guide*. Drexel Avenue at 58th Street, Chicago 37, Illinois, American Technical Society, 1948. 367 pp. \$4.50. (Study Guide \$1.25.)

Includes information on lime, its manufacture and application, mortar types, concrete characteristics and mixing, concrete masonry, structural clay tile, brick masonry, etc.

Dalzell, J. R., and Townsend, G., *Masonry Simplified—Volume II—With Study Guide*. Drexel Avenue at 58th Street, Chicago 37, Illinois, American Technical Society, 1948. 405 pp. \$5.00. (Study Guide \$1.25.)

Includes building forms for concrete, waterproofing, design and construction, and experience-tested methods of handling glass blocks and insulating blocks.

Dalzell, J. R., and Townsend, G., *Concrete Block Construction for Home and Farm*. Drexel Avenue at 58th Street, Chicago 37, Illinois, American Technical Society, 1951. 216 pp. \$2.75. (Study Guide \$.65.)

Covers building of a structure from planning through completion with illustrations showing the most efficient practices in the use of concrete blocks.

Derwallis, Jerome F., *111 Projects for the General Shop, Part 4—Concrete Work.* (20 Projects.) Peoria 3, Illinois, Charles A. Bennett Company, Inc., 1940. 20 pp. \$65.

A publication in loose-leaf form developed and designed by a commercial designer and an experienced shop instructor. Of special interest to industrial arts classes.

DeSager, Walter, *Making Pottery.* 432 Fourth Avenue, New York 16, Thomas Y. Crowell Company, 1934. 96 pp. \$4.00.

A handbook for student or craftsman supplemented with photographs. Emphasizes the creative satisfaction of the craft.

DeVegh, G. and Mandi, A., *The Craft of Ceramics.* New York 3, D. Van Nostrand Company, Inc., 1949. 145 pp. \$4.00.

Written by teachers and practicing craftsmen, this book is a complete easy-to-follow guide that brings within reach of the beginner the fundamental skills required for the practice and enjoyment of creative ceramics. Illustrated with detailed diagrammatic drawings and halftone plates.

Divine, J. A. F., and Blachford, G., *Pottery Craft.* Peoria 3, Illinois, Charles A. Bennett Company, Inc., 1948. 86 pp. \$2.75.

Emphasizes acquisition of skill through experience. Includes helpful suggestions for beginners.

Divine, J. A. F., and Blachford, G., *Stained Glass Craft.* Peoria 3, Illinois, Charles A. Bennett Company, Inc., 1940. 116 pp. \$2.75.

This book points up the unique features of this craft. Illustrations explain the various processes in logical sequence. Chapters included cover etching, silver-staining, firing, experiments with glass, equipment, tools and materials, and stained glass as a school craft.

Dougherty, John Wolfe, *Pottery Made Easy.* Milwaukee, Wisconsin, The Bruce Publishing Company, (Eighth Printing), 1950. 192 pp. \$2.75.

A complete analysis of pottery on the level of the amateur craftsman with detailed descriptions of various methods: coil, sticking up with slabs, modeling, casting, pressing in molds, and throwing-on-a-wheel. Simple, easy-to-follow instructions and helpful illustrations cover every phase of work from the mixing and wedging of the clay to the forming, decorating, finishing, and glazing of the object. A chart is included designed to help the beginner choose from a wide variety of projects which embody certain processes he has learned and which will illustrate how the chosen object is made by performing these processes in their proper sequence.

Duncan, Julia H., and D'Amico, Victor, *How to Make Pottery and Ceramic Sculpture.* Scranton 9, Pennsylvania, International Textbook Company, 1947. 96 pp. \$2.50.

An introduction to ceramic processes and materials, including twenty projects based on hand construction requiring a minimum of tools. Designed to help beginners learn how to make pottery and sculpture in clay.

Henson, Catherine M., *How to Enamel on Copper.* Box 456, Laguna Beach, California, Foster Art Service, Inc., 1953. 40 pp. \$1.00.

A basic reference book on the processes used in enameling on copper, illustrated with large photographs.

Home, Ruth M., *Ceramics for the Potter.* Peoria 3, Illinois, Charles A. Bennett Company, Inc., 1952. 229 pp. \$4.50.

A reference book for the more advanced phases of ceramics. Includes chapters that describe chemical composition of potter's clays, their classification, their

characteristics and reactions to heat; information on tables of percentages; compositions and formulas; collecting ceramics; glass; the future of pottery; kilns; and many other important subjects.

Hyman, Richard N., *Ceramics Handbook*. New York City 10, Sterling Publishing Company, Inc., 1953. 144 pp. \$2.95.

Contains 300 photos giving a very complete pictorial presentation of how to make all types of potteryware, ceramic sculpture, and jewelry. Shows how to form a clay object and how to shape and design figurines starting with clay and wedging board, plaster bats and slip. Explains mold-making, slip-casting, fettling, decorating, and how to construct and operate a kiln. Covers glazes and firing and gives directions on how to make a wheel. Includes a Ceramic Equipment Review of interest to instructors.

Janeway, Carol, *Ceramics and Pottery-making for Everyone*. New York 3, Tudor Publishing Company, 1950. 126 pp. \$1.00. (Cloth binding \$3.00.)

A simple, step-by-step instruction course in the art and craft of tile and pottery-making for the beginner. Illustrated with nearly 150 show-how drawings and photographs with full information on where to buy and how to use essential equipment. Includes useful hints, short cuts, and a glossary of terms.

Jenkins, Horace R., *Practical Pottery for Craftsmen and Students*. Milwaukee, Wisconsin. The Bruce Publishing Company, 1941. (4th print) 1950. 204 pp. \$2.75.

A reliable guide for the beginner in ceramics to every phase of pottery from the selection of proper equipment and material to the basic processes. A source of many helpful hints and ideas for the skilled craftsman. Includes a short history of pottery, sources and varieties of clay, and the essential steps in preparing it for modeling, hand building by the coil and strip methods, directions for designing and decorating, mold-making, casting of covers, handles, spouts, etc. Explains the process of throwing-on-the-wheel, turning, trimming, drying, tile-making, pressing, irregular shapes, biscuit-firing, glazes, glazing, and glaze-firing. Completing the books are chapters on equipping a pottery shop, with cost estimates and highlights on commercial production.

Johnson, William H., and Newkirk, Louis V., *The Ceramic Arts*. New York City, The Macmillan Company, 1942, (Third Printing) 1950. 158 pp. \$3.50.

One of a series of books on industrial arts education designed as a pupil text to introduce youth to ceramics. Primarily for the junior high school grades, but useful in any of the senior high school grades. The book is based on an extensive study of industry, courses from progressive school systems, the American Vocational Association report on standards in industrial arts teaching, and research studies by authors during the past ten years. Includes pottery making; industrial methods of manufacturing pottery; adapting glass to modern living; shaping ornamental alabaster; making and using cement and concrete for strength and decoration.

Kenny, John B., *Ceramic Sculpture Methods and Processes*. 201 East 57th Street, New York 22, Greenberg: Publisher, 1953. 256 pp. \$7.50.

Covers all phases of the ceramic sculptor's art from the beginning essentials to the more complicated projects: the studio, working with clay, figure work, models and casting, color, decorative masks, ceramic Christmas cards, etc.

Kenney, John B., *The Complete Book of Pottery Making*. 201 East 57th Street, New York 22, Greenberg: Publisher, 1949. 256 pp. \$7.50.

Includes a modern step-by-step pictorial technique with full-color plates, covering the entire ceramic field for both the beginner and the more advanced. The book is divided into thirteen all-inclusive chapters from an introduction to clay and getting started to decoration and the possibilities of making a living from pottery.

Kohn, Max, and Starfield, Martin J., *Materials and Processes*. 60 Fifth Avenue, New York 11, The Macmillan Company, 1952. 483 pp. \$3.48.

A new textbook in industrial materials and processes with related technical information. Up-to-date facts on where and how industrial materials are obtained, how they are processed, and how they are used. Covers wood, fuels, plastics, metal, and ceramics. The ceramics section includes an introduction to ceramics, structural clay products, bonding materials, and glass.

Leeming, Joseph, *Fun With Clay*. East Washington Square, Philadelphia 5, Pennsylvania, J. B. Lippincott Company, 1944. 96 pp. \$2.75.

A presentation of materials, tools, and methods in a clearly defined manner. Instructions for making tiles, clay figures, animals, vases of all sorts, flower pots, and many other articles. Full instructions are given for the new self-hardening and ovenbaked clays as well as for throwing-on-the-wheel and for firing.

Lemos, Pedro J., and Lemos, Reta A., *Color Cement Handicraft*. Worcester 8, Massachusetts, The Davis Press, Inc., 1922. 201 pp. \$5.00.

A result of much experimentation by the authors with cement and the use of color in an endeavor to parallel in some measure each of the methods employed in the making of fired tiles and pottery. Particular attention is given to simplifying the process of securing permanent form to many of the plastic forms of schoolroom art which have been presented in clay and other perishable mediums. Shows the possibilities for producing art tiles, pottery, and decorations of a high artistic quality. Attention is also given to enriching or refining by color decoration the many objects heretofore made in cement and concrete by industrial arts and vocational students.

Lester, Katherine Morris, *Creative Ceramics*. Peoria 3, Illinois, Charles A. Bennett Company, Inc., 1948. 213 pp. \$4.25.

Primarily written for amateurs and beginners this book covers a wide range of possibilities in clay as a craft. The many possibilities for projects give the creative ability of the worker free range and serve as a stimulus to original endeavor. Includes information on figurines, decorative tiles, ceramic ornament, glazing, firing, mold-making, and casting. The designs are based on finished objects developed under the author's supervision.

Lunn, Dora, *Pottery in the Making*. Peoria 3, Illinois, Charles A. Bennett Company, Inc., 1948. 96 pp. \$4.00.

Content includes: handmade pottery; slab work, brick, tiles, etc.; throwing; drying and finishing; biscuit-firing; glazes and glazing; glost-firing; decoration; mold-making; and casting. Also contains recipes, a glossary, and a brief historical survey of the craft.

Millinet, L. E., and deKonigh, H., *Enamelling on Metal*. 250 Fourth Avenue, New York 3, D. Van Nostrand Company, Inc., 1947. 122 pp. \$3.00.

A practical manual on enameling and painting on enamel as applied particularly to gold and silverware and art metal work.

Mollet, Ralph, *Leaded Glass Work*. 2 West 45th Street, New York 36, Pitman Publishing Corporation, 1933. 88 pp. \$1.60.

Describes in detail the principles and the practices of design with special attention to materials, tools, cutting, and soldering. Complete with illustrations and diagrams which lend clarity to the instructions.

Olson, Delmar W., *Pottery: Getting Started in Ceramics*. Scranton 9, Pennsylvania, International Textbook Company, 1953. 128 pp. \$3.75.

Written for the beginner in pottery-making, this book stresses the enjoyment of trying easy ways of doing things, and of working out new techniques and effects. By the use of basic facts and techniques, the author explains how

anyone can have fun with a lump of clay and from it mold, glaze, and fire pottery. All projects described have been worked out by the author and his students.

Olson, Delmar W., *Pottery: How to Design it and Make it*. Scranton 9, Pennsylvania, International Textbook Company, 1953. 128 pp. \$3.75.

This book, planned for beginners in junior and senior high schools, emphasizes the importance of design. Informally written, it is illustrated with specially prepared photographs. Projects and processes presented bear the authentic stamp of classroom use.

Osburn, B. N., *Constructive Design*. Milwaukee, Wisconsin, The Bruce Publishing Company, 1948. 108 pp. \$5.50.

Of special interest to teachers and designer-craftsmen this book contains plates of designs in metal, wood, clay, leather, textiles, tapestry, plastics, lettering, etc. The plates are accompanied by information on the basic facts of the principal materials that can be formed and shaped for personal use.

Parmelee, C. W., *Ceramic Glazes*. 5 South Wabash Avenue, Chicago 3, Illinois, Industrial Publications, Inc., 1951. 322 pp. \$8.00.

Reference book for the teacher or serious craftsman. Presents a complete study of all types of raw and fritted glazes, lead and leadless. Discusses composition, preparation, application, and firing. Includes information to help with any problem in all types of glazes.

Petrie, Maria, *Modeling*. Peoria 3, Illinois, Charles A. Bennett Company, Inc., 1948. 39 pp. \$1.95.

This illustrated book for the beginner contains five chapters on relief work, simple pottery, clay modeling, and casting.

Phillips, C. J., *Get Acquainted With Glass*. 2 West 45th Street, New York 36, Pitman Publishing Corporation, 1950. 235 pp. \$4.50.

A simplified approach to glass and the glass industry. Discusses the applications of glass in its numerous forms. Contains a directory of glass manufacturers and a glossary of glass terms.

Popular Mechanics Press, *What to Make With Concrete*. Chicago 11, Illinois, Popular Mechanics Press, 1951. 112 pp. \$2.00.

A complete guide to concrete work for home and farm. Tells how to mix, patch, and color concrete. Also includes projects of a practical and ornamental nature.

Radtke, O. Arnold, *Keene Cement Craft*. Milwaukee, Wisconsin, The Bruce Publishing Company, 1943, (Third Printing) 1952. 124 pp. \$2.75.

Shows how Keene cement can be fashioned into small articles with a marble-like appearance. The projects are inexpensive and practical. For each project there is an introduction giving general details and suggestions concerning the particular marble effect to be attained. In addition there are comprehensive bills of material and step-by-step directions for constructing the molds, mixing the colors, casting the cement, removing the casts, and polishing the objects to a high lustre. Projects include a variety of useful objects such as penholders, ash trays, book ends, lamps, candlesticks, and vases all of which can be made in an infinite selection of color combinations.

Ray, J. Edgar, *The Art of Bricklaying*. Peoria 3, Illinois, Charles A. Bennett Company, Inc., 1950. 240 pp. \$4.00.

A book for the student, the apprentice, and the handyman. Instruction is organized as to: purpose; what the student already knows and can do; what he has to learn on a problem; the consecutive steps; and the method of presenting them to the student in logical order. Contains 133 photographs and

line illustrations which include step-by-step photographs of the processes involved in laying corners; full-page plates of various bonds and patterns; student work; and problems in ornamental brickwork. Other chapters include the laying of cement blocks, information on scaffolding, and a complete glossary of terms.

Sanders, Herbert H., *Sunset Ceramics Book*. Menlo Park, California, Lane Publishing Company, 1953. 96 pp. \$1.75.

Describes how to make pottery objects by the hand processes. The book includes many illustrations and step-by-step directions on how to start, and the tools and the processes to use in making some worthwhile ceramic pieces.

Stewart, J. A., *Ceramics For All*. New York City, Barnes and Noble, Inc., 1950. 156 pp. \$1.00. (Cloth, \$2.00.)

A guide for those who want to learn about ceramics for pleasure or for profit. Covers each important step from the making of the model, to the mold, the casting, the finishing, the decorating, bisque-firing, the glaze, glaze-firing, and the kiln. Includes plans for building a small inexpensive kiln which is "foolproof."

Stiles, H. E., *Pottery in the United States*. New York City, E. P. Dutton and Company, Inc., 1941. \$3.00.

Thompson, Thomas E., *Enamelling on Copper and Other Metals*. Highland Park, Illinois, Thomas C. Thompson Company, 1950. 38 pp. \$1.00.

A simplified text on metal enameling specifically designed to assist teachers and hobbyists to get started in this medium.

Turoff, Muriel P., *How to Make Pottery and Other Ceramic Ware*. 419 Fourth Avenue, New York City 16, Crown Publishers, Inc., 1949. 145 pp. \$2.95.

A practical book of instruction showing how to design, make, decorate, and handle articles of clay. A guide to the reader through every necessary and minute detail from the starting point of materials, tools, and equipment for the home or school, through "How to Make Clay Behave," preparing and forming clay, decorating tiles, jewelry, glaze, the kiln, and design. A chapter on ceramics in occupational therapy is also included.

Tyler, Keith, *Pottery Without a Wheel*. Peoria 3, Illinois, Charles A. Bennett Company, Inc., 1952. 69 pp. \$1.50.

The primary aim of this book is to give help to those interested in the craft of pottery who have no access to a potter's wheel. A help to the teacher who wishes to introduce the craft into a classroom with limited facilities. The techniques described are those of potters who have produced work of real beauty with simple materials. Stages of development are presented so that a teacher can introduce them to individual pupils as they acquire skill at their own pace.

Van Den Branden, Felicien, and Knowles, Marck, *Plastering Skill and Practice*. Drexel Avenue at 58th Street, Chicago 37, Illinois, American Technical Society, 1953. 298 pp. \$4.90.

This book is intended to initiate the novice and to up-date the journeyman in the techniques, both new and old, of the plastering trade. There are many photographs and illustrations with which the reader can check his understanding of the written text with step-by-step pictures of the procedures described.

Varnum, William H., *Industrial Arts Design*. Peoria 3, Illinois, Charles A. Bennett Company, Inc., Revised 1948. 248 pp. \$6.00.

A comprehensive, practical discussion of design as applied to wood, clay, and metal. Develops the principles of industrial design in a logical form which simplifies the teaching of craft design.

Wager, Victor H., *Plaster Casting for the Student Sculptor*. Peoria 3, Illinois, Charles A. Bennett Company, Inc., 1946. 96 pp. \$2.25.

The object of this book is to explain as simply as possible, the complicated processes of molding the sculptor's model into plaster. Processes are described and illustrated with ample annotations where such are necessary to emphasize the point of issue. Includes a chapter on bronzing and coloring and a chapter on papier-maché.

White, Roy W., *Building Practice Manual*. Boston, Massachusetts, D. C. Heath and Company, 1952. 307 pp.

Contains detailed information in the kinds of computation which are commonly required of the building craftsman on the job and also provides simple methods by which he can estimate accurately various kinds of building materials which he uses in his work. It is suitable for a textbook in trade preparatory and apprentice training classes in the building trades. The appendix includes data of various kinds, given in tabulated form, of interest to the industrial arts teacher.

Wren, Denise K., and Wren, Rosemary D., *Pottery Making*. 2 West 45th Street, New York City, Pitman Publishing Corporation, 1952. 152 pp. \$3.50.

Covers the art of pottery-making along with a full description of the building and firing of small kilns. The new methods which deal with salt-glazing, molded dishes, feathering, the pugmill, and the electric wheel are included with a section on pottery-making as it is taught in the schools today.

MAGAZINES AND TRADE PUBLICATIONS

Brick and Tile. Columbia Brick Works, 1230 S. E. Water Avenue, Portland, Oregon. Monthly. Free.

Ceramic Age. Ceramics Publishing Company, 421 Parker Street, Newark 4, New Jersey. Monthly. \$3.00 per year.

Ceramic Forum. O. Hommel Company, P. O. Box 475, Pittsburgh, Pennsylvania. Monthly. Free.

Ceramic Industry. Industrial Publications, Inc., 5 South Wabash Avenue, Chicago 3, Illinois. Monthly. \$4.00 per year.

Ceramics Monthly. Professional Publications, Inc., 3494 North High Street, Columbus 14, Ohio. Monthly. \$4.00 per year.

Chinaware—Its Selection and Maintenance. Onondaga Pottery Company, Syracuse, New York.

Concrete. Concrete Publishing Corporation, 400 West Madison Street, Chicago 6, Illinois. Monthly. \$4.00 per year. \$.50 per copy.

Craft Horizons. Craft Horizons, Inc., 601 Fifth Avenue, New York City 17. Bimonthly. \$4.00 per year.

Crafts and Hobbies. Fox-Shulman Publications, Inc., 30 East 29th Street, New York 16. Monthly. \$4.00 per year.

Design. Design Publishing Company, 337 South High Street, Columbus, Ohio. \$4.00 per year.

Industrial Arts and Vocational Education. The Bruce Publishing Company, 400 North Broadway, Milwaukee 1, Wisconsin. \$3.00 per year.

Journal of the American Ceramic Society. Ceramics Society, Inc., 2525 North High Street, Columbus 2, Ohio. Monthly. \$14.00 per year.

Journal of the American Concrete Institute. American Concrete Institute, 18263 West McNichols Road, Detroit, Michigan. 10 times per year. \$12.00 per year.

Masonry Building. Industrial Publications, Inc., 5 South Wabash Avenue, Chicago 3, Illinois. Monthly. \$2.00 per year.

- Mineral Industries.* School of Mineral Industries, The Pennsylvania State University, University Park, Pennsylvania. Monthly from October through May. Free.
- Occupational Outlook Handbook—No. 998.* U. S. Government Printing Office, Washington, D. C., 1951. \$1.75 per copy.
- Popular Ceramics.* Fred de Linden Publication, 417 North Figueroa Street, Los Angeles 12, California. Monthly. \$3.00 per year.
- School Arts.* 400 Woodland Drive, Buffalo 25, New York. Monthly from September through June. \$5.00 per year.
- School Shop.* 330 South State Street, Ann Arbor, Michigan. Monthly. \$3.00 per year.
- Stained Glass.* Stained Glass Association of America, 65 Edgemoor Road, Berkeley 7, California. Quarterly. \$2.00 per year.
- The Mason Contractor.* Structural Clay Products Institute, 1500 18th Street, N. W., Washington 6, D. C. Monthly. Free.

FILM SOURCES AND TITLES

- ABC of Pottery Making—The Coil Method.* Bailey Films, Inc., 6509 De Longpre Avenue, Hollywood 28, California. 16 mm., sound, 9 minutes (silent, 15 minutes). Rental charge.
Some of the common tools used, thorough wedging of the clay, the rolling of coils. Detailed demonstrations of forming the base, applying the coils, blending one coil into another, shaping on the potter's wheel, and smoothing with wet sponge.
- Abrasives, Manufactured.* United States Bureau of Mines, 4800 Forbes Street, Pittsburgh, Pennsylvania. 16 mm., sound or silent, 24 minutes. Transportation charges.
- Arts and Crafts in Mexico.* Ideal Picture Corporation, 28 East 8th Street, Chicago 5, Illinois. 16 mm., sound, 11 minutes. Rental charge.
- Art of Keramos.* Franciscan Library of Ceramics, 45 East 51st Street, New York City 17. 16 mm., sound, color, 26 minutes. Transportation charges.
Contains a brief history of ceramics from prehistoric days to present day manufacture of ceramic products.
- Capers in Clay.* Astor Pictures Corporation, 130 West 46th Street, New York City, 19. 16 mm., sound, 11 minutes.
A young lady fashions interesting little figures from clay.
- Chinese Ceramics Thru the Ages.* Athena Films, Inc., 165 West 46th Street, New York City 19. 16 mm., sound, color, 20 minutes. Rental charge.
Shows the evolution of Chinese ceramics from neolithic earthenware to pure porcelain.
- Clay in Action.* Encyclopaedia Britannica Films, Inc., 351 West 41st Street, New York City 18. 16 mm., sound, 10 minutes. Transportation charges.
Step-by-step demonstration of a sculptor modeling a head in clay. Shows how an artist packs the clay on wooden supports, the first rough carving, the progressive steps of refinement until the work is completed.
- Crafts of the Fire.* A. F. Films, Inc., Room 1001, 1600 Broadway, New York City 19. 16 mm., sound, 10 minutes. Rental charge.
Function of fire in the handicrafts of man. The fusion of fire in the making of enamels, glassware, porcelain, pottery, and dinnerware.

Craftsmanship in Clay: Decoration. Educational Film Library Association, 1600 Broadway, New York City 19. 16 mm., sound, color, 10 minutes. Rent from Indiana University, Audio-visual Center, Bloomington, Indiana; also The Pennsylvania State University, Audio-visual Aids Library, University Park, Pennsylvania.

Introduces decoration as adding visual interest to form and shows the three basic materials used for applying designs on clay—surface-clay, glaze, and clay slip. Useful for teaching the basic skill needed and for motivation in and appreciation for ceramic art.

Craftsmanship in Clay: Glaze Application. Educational Film Library Association, 1600 Broadway, New York City 19, and Indiana University, Audio-visual Center, Bloomington, Indiana. 16 mm., sound, color, 10 minutes. Rent from Indiana University, Audio-visual Center, Bloomington, Indiana; also The Pennsylvania State University, Audio-visual Aids Library, University Park, Pennsylvania.

Introduces glazing as an activity of pottery makers and demonstrates four methods of applying glaze—dipping, brushing, pouring, and spraying.

Craftsmanship in Clay: Simple Slab Method. Educational Film Library Association, 1600 Broadway, New York City 19, and Indiana University, Audio-visual Center, Bloomington, Indiana. 16 mm., sound, color, 10 minutes. Rent from Indiana University, Audio-Visual Center, Bloomington, Indiana; also The Pennsylvania State University, Audio-visual Aids Library, University Park, Pennsylvania.

Techniques by which attractive pottery pieces may be made from clay are pictured. An expert potter, working in a ceramic studio, demonstrates simple methods of making slab pieces. As he works, his tools are introduced and their proper use explained. The film not only gives basic information; it also points out that imagination in design and attention to points of fine craftsmanship will produce pottery which affords both pride and pleasure.

Craftsmanship in Clay: Stacking and Firing. Educational Film Library Association, 1600 Broadway, New York City 19, and Indiana University, Audio-visual Center, Bloomington, Indiana. 16 mm., sound, color, 10 minutes. Rent from Indiana University, Audio-visual Center, Bloomington, Indiana; also The Pennsylvania State University, Audio-visual Aids Library, University Park, Pennsylvania.

Demonstrates the correct stacking of both green and glazed pottery in a small kiln. The potter shows each step in the firing of the pieces. The results of correct and incorrect stacking and firing techniques are clearly shown.

Craftsmanship in Clay: Throwing. Educational Film Library Association, 1600 Broadway, New York City 19, and Indiana University, Audio-visual Center, Bloomington, Indiana. 16 mm., sound, color, 10 minutes. Rent from Indiana University, Audio-visual Center, Bloomington, Indiana; also The Pennsylvania State University, Audio-visual Aids Library, University Park, Pennsylvania.

Shows how various pieces of pottery are shaped on a potter's wheel. Demonstrates how the wheel is turned by a foot pedal and how the speed of turning is controlled by the foot movement. A bowl, low flat plate, and a pitcher are formed.

Drama of Portland Cement. Modern Talking Picture Service, Inc., 45 Rockefeller Plaza, New York City 20, 16 mm., sound, 30 minutes. Transportation charges.

Shows the production of portland cement from raw material to finished product. Describes the research and development work of the Portland Cement Association and presents outstanding examples of cement and concrete construction.

Fine Tableware in the Making. Modern Talking Picture Service, Inc., 45 Rockefeller Plaza, New York City 20. 16 mm., sound, color. Transportation charges.

A tour of the plant where Royal Doulton bone china and earthenware is made. It traces the manufacture of plates and cups from original patterns on the chief designer's desk through the production line to band finishing by artists.

Glass. Almanac Films., Inc., 516 Fifth Avenue, New York City 18. 16 mm., sound, 10 minutes.

Traces the development of the plate glass industry from the beginning of the Dark Ages to the present. Shows visits to a glass factory where the basic elements of sand, sodium, and heat are combined to make plate glass.

How a Mould is Made From a Modeled Cup. Harmon Foundation, Division of Visual Experiment, 140 Nassau Street, New York City 38. 16 mm., silent, color, 15 minutes.

Shows in detail the steps involved in making a mold from a modeled cup, from the crushing and sifting of the dry clay to the final glaze-firing of the biscuit.

How to Make a Plaster Cast. Almanac Films, Inc., 516 Fifth Avenue, New York City 18. 16 mm., sound, 20 minutes.

Visualizes in detail the cutting of the shims, preparation of the plaster, slow motion of the wet-plaster "flipping," making the mold and preparing it for casting, pouring of the plaster, chipping away, and final touches of the completed cast. The method employed is basic to all forms of casting and is presented in the simplest terms.

Let's Play With Clay. (2 parts). Young America Films, Inc., 18 East 41st Street, New York City 17. 16 mm., sound, 10 minutes.

An introductory film on clay work, specifically designed for the younger age level. Shows how clay is worked with the hands, either pressed or rolled into the simple shapes of some familiar animals. Part 1 demonstrates the making of a bird, cat, snowman, etc. Part 2 shows how the bowl form is altered and manipulated in various ways to form a saucer, a cup, a pitcher, a bowl, or a vase.

Made in Occupied Japan. Department of the Army, Washington, D. C. 16 mm., sound, color, 17 minutes. Transportation charges.

A film showing the revival of the pottery industry in Japan and the various processes involved in making pottery, including molding, shaping, baking, and decorating.

Make a Plaster Plaque. Elias Katz, 1128 South Vegas Street, Alhambra, California. 16 mm., silent, 30 minutes. Rental charge.

Shows the complete process, from making the design, the clay base, making the mold, the cast from the mold, to painting the completed plaque.

Making a Stained Glass Window. University of California, University Extension, Visual Department, 2272 Union Street, Berkeley, California. 16 mm., sound, color, 22 minutes. Rental charge.

Historical backgrounds. Techniques demonstrated by artist step by step: forms outlined and traced on paper; cutting of glass; window painted with lead lines; colored pigment painted on cut glass, then fired in glass-firing kiln; enriched by dusting, painting, and scraping; receives final firing and is leaded; lead joints soldered; putty worked between glass and lead on both sides of window to make airtight; window cleaned with chalk and sawdust; the finished product.

Making Bricks for Houses. Encyclopaedia Britannica Films, Inc., 351 West 41st Street, New York City 18. 16 mm., sound, 10 minutes. Rental charge.

Portrays the story of brickmaking from the digging of the basic material, shale, to the loading of finished brick into freight cars for shipment. Shows how materials are assembled, pulverized and mixed; how the bricks themselves are shaped, cut, dried, baked, and finally graded for color and quality.

Making Glass. Henry Sazin, 723 Seventh Avenue, New York City 19. 16 mm., silent, 14 minutes. Rental charge.

Photographed at the glass center at the New York World's Fair. Follows the process step by step, from the furnace to the finished product, showing the making of four different objects.

Making Glass for Houses. Encyclopaedia Britannica Films, Inc., 351 West 41st Street, New York City 18. 16 mm., sound, 10 minutes. Rental charge.

Describes how the three ingredients of glass—limestone, sand, and soda ash—are obtained. Close-up shots present a sample laboratory demonstration of basic glassmaking techniques. The manufacture of glass on a large scale is portrayed step by step. The technique of fitting glass panes into window frames is seen in the final episode.

Making of Fine China. United World Films, Inc., 1445 Park Avenue, New York City 29. 16 mm., sound, color, 25 minutes. Transportation charge.

Shows artists working out the decorations, the firing of the color, and all the operations in the manufacture of china tableware as well as fragile china ornaments. (Not available to schools below high school level.)

Mexican Potters. Paul Hoeffler Productions, 7934 Santa Monica Boulevard, Los Angeles 46, California. 16 mm., sound, color, 11 minutes.

Shows a way of life found in the smaller towns and villages of Mexico where artist-craftsmen ply their trade as they have for centuries. Illustrates how regional traditions of design and available materials have created distinctive types of pottery in various sections of Mexico.

Pottery From the Wheel. Encyclopaedia Britannica Films, Inc., 351 West 41st Street, New York City 18. 16 mm., sound, color, 15 minutes. Rental charge.

A film directed to those students with previous pottery training who are now ready to enter the art of throwing pottery on the wheel.

Pottery Making. Encyclopaedia Britannica Films, Inc., 351 West 41st Street, New York City 18. 16 mm., sound, 11 minutes. Rental charge.

Shows a professional potter at work mixing clay prior to centering it on a wheel, shaping, trimming, and preparing it for firing. An Indian bowl is constructed by the ancient method of building up and shaping coils of clay. The use of a plaster cast in the modeling of duplicate pieces is demonstrated. The art of making angular-shaped pottery by cementing together slab pieces is shown along with methods of decorating and firing.

Techniques of applying glazing slip by dipping, brushing, spraying, and pouring are treated. After firing, glazed pieces are removed from the furnace and displayed in a home setting.

Pottery Making—The Cast Method. University of California, University Extension, Visual Department, 2272 Union Street, Berkeley, California. 16 mm., silent, 18 minutes.

Illustrates the operation in making pottery by the cast method and many processes for decorating the finished surface.

Sand and Flame. United States Bureau of Mines, Graphic Services Section, 4800 Forbes Street, Pittsburgh 13, Pennsylvania. 16 mm., sound, 21 minutes. Transportation charge.

Shows the production of all kinds of glass including plate glass, structural glass, blown and spun glass.

Simple Ceramics. Allen-Moore Productions, Inc., 213 West 7th Street, Los Angeles 14, California. 16 mm., sound, black and white, and color, 10 minutes. Rental charge.

Demonstrates the steps in the making of a fruit bowl by the hammock-mold method, using simple tools and ordinary potter's clay.

Story of Portland Cement. Bemis Brothers Bag Company, Packaging Service, Minneapolis, Minnesota. 16 mm., sound, color, 36 minutes. Transportation charge.

The story of the manufacture of cement from the quarry to the railroad shipment from the cement plant.

Story of the Cup. Gladding McBean Company. 16 mm., silent, 13 minutes. Transportation charge.

Shows in detail all the processes necessary to produce a cup.

Tableware. Encyclopaedia Britannica Films, Inc., 351 West 41st Street, New York City 18. 16 mm., silent, 15 minutes.

Modern methods of manufacture, as preparing clays for pottery, modeling, casting, firing, decorating tableware.

Technique of Making a Ceramic Tile. Harmon Foundation, Division of Visual Experiment, 140 Nassau Street, New York City 38. 16 mm., silent, color, 30 minutes. Rental charge.

Demonstrates each step in tile-making, including digging the clay, wedging it, ways of decorating the fired tile, mixing of glazes and their application.

The Making of Fine China. Lenox Incorporated, Trenton 5, New Jersey. 16 mm., sound, color, 20 minutes. Rental charge.

The Oldest Art. Franciscan Library of Ceramics, 45 East 15th Street, New York City 17. 16 mm., sound, 25 minutes. Transportation charge.

The history of the making of dishes and dinnerware as revealed to two young people who visit a museum. Includes examples of primitive pottery, early Egyptian and Greek ceramics, Chinese and recent European porcelain. Methods of present-day manufacture of china are also shown.

The Pottery Wheel. Allen-Moore Productions, Inc., 213 West 7th Street, Los Angeles 14, California. 16 mm., sound, 9½ minutes. Rental charge.

Shows the proper method of throwing on the potter's wheel. Two basic shapes are formed—a small pitcher with handle and applique, and a large pitcher with handle.

Use of the Potter's Wheel. Harmon Foundation, Division of Visual Experiment, 140 Nassau Street, New York City 38. 16 mm., silent, color, 30 minutes. Rental charge.

The whole process of making a clay object on a potter's wheel is illustrated in detail.

Filmstrips

Ceramics. Charles A. Bennett Company, 237 North Monroe Street, Peoria 3, Illinois. Silent with captions. Sale price \$3.25.

Based on the book *Creative Ceramics* by Katherine Morris Lester. Covers such items as tools, tiles, figurines, slip-casting, slab-built pottery and pottery formed on the potter's wheel.

Let's Work With Self-Hardening Clay. Visual Education Consultants, Inc., 2066 Helena Street, Madison 4, Wisconsin. 27 frames, silent with captions.

Shows how to select, mix, mold, and decorate self-hardening clay.

BOOKLETS, BULLETINS, AND PAMPHLETS

A Practical Course In Concrete. Portland Cement Association, 33 West Grand Avenue, Chicago 10, Illinois.

Basic Course in Tile Setting. The Tile Council of America, 10 East 46th Street, New York City 16.

- Building With Concrete Masonry.* Portland Cement Association, 33 West Grand Avenue, Chicago 10, Illinois.
- Cement and Concrete Reference Book.* Portland Cement Association, 33 West Grand Avenue, Chicago 10, Illinois.
- Ceramic Data Book.* Industrial Publications, Inc., 5 South Wabash Avenue, Chicago 3, Illinois.
- Concrete Basements.* Portland Cement Association, 33 West Grand Avenue, Chicago 10, Illinois.
- Concrete Improvements Around the Home.* Portland Cement Association, 33 West Grand Avenue, Chicago 10, Illinois.
- Dinnerware.* Department of Research, Household Finance Corporation, Chicago, Illinois.
- Facts About Concrete Masonry.* National Concrete Masonry Association, 33 West Grand Avenue, Chicago 10, Illinois.
- From the Dawn of History.* Mayer China Company, Beaver Falls, Pennsylvania.
- Handbook and Materials For the Studio Potter.* Frank Joneman, B. F. Drakenfield and Company, 45 Park Place, New York City 7.
- Handbook of Concrete Farm Construction.* Portland Cement Association, 33 West Grand Avenue, Chicago 10, Illinois.
- How to Sharpen.* Behr Manning Corporation, Troy, New York.
- Master Caster.* United States Gypsum Company, Opera Building, 20 North Wacker Drive, Chicago 6, Illinois.
- Metal Enamelling.* American Art Clay Company, 4717 West 16th Street, Indianapolis 24, Indiana.
- Picture of a Pottery.* Haeger Potteries, Inc., Dundee, Illinois.
- Plasterers' Manual for Applying Portland Cement, Stucco and Plaster.* Portland Cement Association, 33 West Grand Avenue, Chicago 10, Illinois.
- Story of Glass.* Libby-Owens-Ford Glass Company, Public Relations Department, Department EPS, Toledo 3, Ohio.
A unit of 5 pamphlets: Window Glass in Colonial America; Window Glass in the United States, 1800-1850; Window Glass in the United States, 1850-1900; Window Glass in the United States after 1900; The Story of Glass.
- The Art and Techniques of Ceramics.* Brooklyn Museum, Brooklyn, New York.
- The Ceramic Industries of Pennsylvania.* Joseph B. Shaw, The Pennsylvania State University, University Park, Pennsylvania, Mineral Industries, Bulletin No. 7, 1930.
- The Mineral Industries of Pennsylvania.* Raymond E. Murray, The Pennsylvania State University, University Park, Pennsylvania, Mineral Industries, Bulletin No. 27, 1939.
- Things You Should Know About China.* Castleton China, Inc., New Castle, Pennsylvania.
- Type of Workmanship Recommended to Secure Dry Brick Walls.* Louisville Cement Company, Louisville, Kentucky.
- United States Department of Agriculture, Agricultural Research Administration, Bureau of Plant Industry, Soils and Agriculture Engineering, Beltsville, Maryland. Information series as follows:
Information Series No. 32 (Revised), *Plaster and Plastering.*
Information Series No. 54, *Rubble Masonry.*
Information Series No. 56 (Revised 1951), *Concrete Blocks.*
Information Series No. 58 (Revised 1950), *Concrete Fence Posts.*
Information Series No. 75, *Waterproofing Concrete and Other Masonry Walls Above Ground.*
- Use of Concrete On the Farm.* Office of Information, United States Department of Agriculture, Washington 25, D. C.

5 Tools, Equipment

MACHINERY AND SUPPLIES

THE HAND TOOLS, MACHINERY, OTHER EQUIPMENT AND SUPPLIES recommended in this bulletin are based on the minimum requirements for ten pupil stations in the Ceramics Area. It is presumed that Ceramics will be taught as one of several activities in a comprehensive general shop at the junior and/or senior high school level.

How to Select Equipment

The Industrial Arts teacher frequently needs to recommend replacement of worn-out hand tools, machine tools, and other equipment, or he may be consulted on the purchase of new equipment for the shop. One measure of the success and stature of the Industrial Arts teacher is the astuteness with which he makes his recommendations. Recommending new equipment to replace obsolete or worn-out equipment and the ordering of hand tools and supplies require forethought and sound judgment, if the teacher is to win and retain the respect of his supervisors. No two schools have the same budget, physical plant, or education program; therefore, all planning of tools, equipment, and supply needs must be made to fit local needs and resources.

Factors to be considered in determining the quantity and type of equipment to be selected for the Ceramics Area of a comprehensive general shop are:

1. The objectives to be attained through its use
2. The activities planned
3. The size of the class
4. Content and scope of the course
5. The age group of the pupils, *i.e.*, junior and/or senior high school level
6. Funds available
7. Space available
8. Adequacy of safety devices
9. Flexibility; adaptation to other uses
10. Power requirements—water, gas, etc.

How to Specify and Order Equipment

The purchase of suitable equipment for Industrial Arts shopwork requires considerable thought and study so that the equipment purchased will adequately fit the planned program of instruction and allow for efficient shop organization.

It is essential that complete written specifications be prepared to be submitted to various equipment companies for bidding purposes. These specifications should be based on the manufacturers' descriptions and on catalog numbers. They should ordinarily be written around a specific item which most nearly meets the requirements.

To reduce the possibility of discrimination when writing specifications, it is advisable to follow a specific manufacturer's item with the words "or equal." The term "or equal" may be included in a statement "Instructions to Bidders" which generally precedes the listings.

The essential information generally required to write specifications is as follows:

1. Item number
2. Quantity desired
3. Unit of measure
4. Catalog number
5. Name of item
6. Complete description of item—size, color, electrical specifications, gas and water requirements, and accessories

How to Keep a Shop Inventory

Many different methods of keeping a shop inventory are used in Industrial Arts shops. The type used depends somewhat on the local school organization. In larger systems, methods of keeping inventories are set up by the administrative office. In smaller systems, however, the job of keeping inventory is usually the job of the individual teacher. The advantages of keeping an accurate inventory are many—only a few of the more important ones are listed here. The inventory form:

1. Tells, at all times, the quantity of stock and supplies on hand.
2. Gives accurate information as to the amount that was used during the past year.
3. Determines the amount needed for the next year.
4. Justifies quantities on requisitions to the superintendent of schools and board of school directors.

A suggested form that has been used successfully by many teachers is shown below.

SAMPLE INVENTORY FORM

<i>On Hand</i>		<i>To Be Ordered</i>		<i>Cost</i>	
<i>Start of Year</i>	<i>End of Year</i>	<i>To Be Ordered</i>	<i>Description</i>	<i>Each</i>	<i>Total</i>

Storage and Control of Tools, Supplies, and Projects

The storage and arrangement of tools are best taken care of in the Ceramics Area of the comprehensive general shop through the use of tool panels on which all tools are mounted so that they may be seen easily by pupils and teacher. Plywood panels cut to convenient size with a natural finish make attractive panel boards on which to mount tools. Outlines of tools may be painted on the panel to indicate the proper location for each tool, or sheet metal or masonite outlines may be screwed to the plywood. Screwing these sheet metal or masonite tool outlines to the panel makes it possible to remove or change the position of tools without leaving unsightly marks as is the case when painted outlines are used.

Supplies frequently used may be conveniently stored as an integral part of the tool panel in glass jars, drawers, and compartments. Adequate storage of dry clays, Keene cement, portland cement, sand, lime, mortar cement, gravel, etc., must be provided.

Adequate drying shelves or a damp cabinet must be provided for the storage of individual projects before firing as well as for the individual project storage of completed projects.

Tool and Equipment Lists

The hand tools, machinery, and other equipment suggested in this bulletin are based on the minimum requirements for two people in each subarea or a total of ten pupils in all areas of Ceramics when it is organized as one area of a comprehensive general shop which operates six periods per day for a full school year.



HAND TOOLS, EQUIPMENT, AND MACHINERY LISTS

Unit A: Pottery and Tile¹

<i>Quantity</i>	<i>Item</i>	<i>Approximate Cost</i>
	Basins, plastic, polyethylene	
1	2 gal. capacity	.75
2	1 gal. capacity	1.20
2	1 qt. capacity	.60
1	Bench, work, 30" x 72" x 33½" high, storage below, wood top	138.00
2 sets	Boxwood, 12 assorted shapes	3.95
	Brushes, pottery	
2	7/8" flat, No. 5	1.50
2	1/4" flat, No. 2	.70

¹ For two pupils per class.

<i>Quantity</i>	<i>Item</i>	<i>Approximate Cost</i>
2	round pointed #160	.50
1 ¹	Clay storage bin	
4	Crocks, masonry, 5 gal. with plywood covers	5.00
1	Damp cabinet—secondhand refrigerator with cooling unit removed	10.00
25 sq. ft. ¹	Drying shelves, 8" to 12" apart, 12" wide, made of slats for good air circulation.	
1	Finishing rubber, 2½" x 3¼"	.50
12	Jars, glass, ½ pt. with caps to fit sprayer	2.50
1 ²	Kiln, electric for pottery-firing up to 2050° F. approximately 1 cu. ft. firing space, bench model	205.00
2	Knives, fettling	1.00
2	Mortars and pestles, 16 oz. porcelain	8.50
1	Potter's wheel, electric motor-driven, variable speed, 10" diameter head, foot control, water pan and arm rests.	98.50
1	Rolling pin, 2¼" x 18", wooden	1.40
	Scrapers, flexible	
1	2" x 4" half moon	.30
1	2" x 4" rectangle	.30
1	Scale, laboratory, graduated in grams 1 to 75 with set of weights to four ounces	10.75
1 set	Sgraffito, holder and six blades	1.25
1	Sifter, flour, 1 qt.	.60
	Sieves	
1	80 mesh, brass sieve cloth, 11" metal frame	5.00
1	50 mesh, brass sieve cloth, 11" metal frame	4.25
1	30 mesh, brass sieve cloth, 11" metal frame	4.00
1	Sprayer, hand, with glass jar	2.75
2	Spatulas, moldmakers, 4" blade	.75
2	Sponges, elephant ear	1.30
1	Wedging board, 22" x 14¾" x 14"	20.00
2	Whirlers, bench, 7" aluminum head	10.00

¹ May be made in school shop.

² If additional firing space is required, it is better to order several small kilns rather than a large one. This saves pupils' waiting time and reduces unnecessary expense.

Unit B: Keene Cement¹

Basins, plastic, soft flexible

1	2 gal.	.75
2	1 gal.	1.20
4	1 qt.	1.20
1 set	Chisels, woodworking, ¼", ⅜", ¾", 1"	9.35
1 set	Drills, jobbers, carbon steel, ⅛" to ½" x 32 rds.	4.93
	Files	
2	flat 8", 2d cut	1.20
2	round, 8", 2d cut	.96
2	square 8", 2d cut	1.24

¹ For two pupils per class.

<i>Quantity</i>	<i>Item</i>	<i>Approximate Cost</i>
2	half-round 8" 2d cut	1.64
2	triangular 6", 2d cut	1.01
1 ¹	Glass, shatterproof type, car window 18" x 18"	
1	Knife, table, stainless steel	.35
An assortment ²	Molds, standard, for beginning work	
2	Planes, block	7.42
	Saws	
1	back 12"	4.15
1	coping 6½"	.73
	Squares	
1	try 6", steel	1.28
1	combination 12"	2.10

¹ May be purchased from junk dealer at very little cost.

² May be made in school shop.

Unit C: Concrete and Masonry¹

1 ²	Box, measuring 1 cu. ft.	
	Brushes	
1	Wire, 2½" x 7½"	.65
1	Calcimine 7"	4.00
1	Chisel, brick	1.30
1	Edger, wood, 6", ⅜" radius	1.85
1 ²	Float, wood, 4½" x 12"	
	Gloves	
2 prs.	Cotton, leather palms	.79
1 pr.	Rubber	2.50
2	Hammers, brick	2.85
1	Jointer, 6" length, 2¾" width, depth of cut ½", width of cut ⅜"	1.50
	Levels	
1	Masons, 48" wood, metal-bound	13.75
1	Masons, 42" wood, metal-bound	13.75
1	Masons, 24" wood, metal-bound	8.25
1	Line, chalk	.10
1 pr. ²	Line blocks	
1 ²	Mortarboard, 30" x 30"	
3	Pails, water, 8 qt.	2.46
1	Pointing or jointing tool, ½" to ⅝" radius	
1	Rubbing brick, coarse grit, 8" x 3½" x 1½", with handle	3.35
2	Rules, mason's, 6' zigzag	1.60
2	Shovels, square point, blade 9⅞" x 11¾", split dee handle, 27" long	3.75
4 ²	Straightedges, wood, various lengths to 4'	
1	Square, carpenters, steel, 16" x 24"	3.95
1 ²	Tamper, 6" x 6" with 4' handle	

¹ For two pupils per class.

² May be made in school shop.

<i>Quantity</i>	<i>Item</i>	<i>Approximate Cost</i>
	Trowels	
2	brick masons, 10" x 4 $\frac{7}{8}$ " blade	7.50
2	finishing, 10 $\frac{1}{2}$ " steel	3.95
2	pointing, 5"	1.10

If colored cement tile-making is to be included as an activity within the masonry and concrete division, the following equipment may be added to the above list. Colored cement tile can be as permanent, useful, and decorative as fired clay tile.

	Brushes	
1	camel's-hair, round, $\frac{5}{16}$ "	.55
1	camel's-hair, flat, $\frac{1}{4}$ "	.60
1	bristle, small	.25
1	File, half-round vixen, standard, 10"	2.70
2 pieces	Glass, plain, 12" x 18"	.62
	Knives	
1	table	
1	Palette, 3" trowel-shaped polished steel blade	.80
1	Mortar and pestle, 8 oz. porcelain	3.75
1	Tool, clay-modeling, double-ended	.30
6	Saucers (to mix colors)	.30
1	Sifter, flour (to sift cement and color pigments for glazes)	.35
2	Spoons, large	.20

Unit D: Metal Enameling¹

1	Atomizer, hand	1.50
1	Bowl, pyrex, 2 qt.	.89
1	Fork, enameling, heat-resistant, 17" long	1.50
4	Jars, 1 pt. with lids	
1	Kiln, electric, 110V AC-DC, front loading, firing chamber 5" x 5" x 4", maximum firing temperatures up to 2000° F., with pyrometer and thermocouple. Amco No. 61E or equal	69.95
1	Pancake turner, long handle, stainless steel	1.35
1	Pitcher, measuring, 1 qt., pyrex glass	.79
1	Rack, enameling, 4" x 3" wire mesh, stainless steel or monel metal	.60
1	Spatula, 4" blade	1.00
2	Stones, carborundum, $\frac{3}{4}$ " x 8", 140 grit	.88
2 each	Star stilts, $\frac{1}{4}$ ", $\frac{3}{4}$ ", $\frac{1}{2}$ ", 1 $\frac{1}{2}$ ", 2 $\frac{1}{2}$ "	7.30
	Trivets, monel metal	
1	Four-prong, 3" x 3", Amco #142 or equal	.70
1	Single groove for 2" rounds and less, Amco #136 or equal	1.25
1	Single groove combination for $\frac{3}{4}$ " and 3" rounds, Amco #138 or equal	.60

¹ For two pupils per class.

Unit E: Glassworking¹

<i>Quantity</i>	<i>Item</i>	<i>Approximate Cost</i>
1 ²	Bench, work, 30" x 48", storage drawers and vertical glass rack underneath	
As required ²	Box, etching (may be cigar box or any other size wooden box depending on size of project)	
	Brushes	
1 each	camel's-hair, round, $\frac{1}{16}$ ", $\frac{1}{8}$ ", $\frac{5}{16}$ "	1.65
1 each	camel's-hair, flat, $\frac{1}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ "	1.80
1	scrub, stiff bristle	.35
1 each	stencil, white bristle, $\frac{3}{8}$ ", $\frac{1}{2}$ "	1.55
	Cutters, glass	
1	circle, graduated 2" to 12" in diameter	2.35
2	straight, wheel	.35
1 ²	Easel (for mounting glass sheet to view "waxed-up" pieces for stained glass window)	
	Files	
As required ²	Triangular (old files ground for glass drilling—see sample operation sheet page 44)	
2	Flat, double cut, smooth, 10"	.90
1	Glass, sheet, double strength, 24" x 36". (Size will depend on size of projects)	1.29
1	Gluepot (may be double boiler arrangement—2 pans) ..	1.00
2	Goggles, full-face	3.95
1	Grinder, flexible sheet, $\frac{1}{2}$ H.P., Universal motor, 12,000 R.P.M., 49" flexible shaft, with foot rheostat. Include 1 complete set of abrasive wheels	55.00
	Hammers	
1	nail, bell-faced, curved claw, 10 oz.	2.45
1	trimmer, 7 oz.	1.75
1	Kiln, electric, 110-115V, AC-DC, front loading, firing chamber 6" x 6" x 6", maximum firing temperature up to 2000° F.	65.00
	Knives	
1	block, $2\frac{1}{8}$ " blade	.55
1	incising	1.00
1	palette, 3", trowel-shaped, polished steel blade	.80
1	Palette, oval, 9" x 12"	1.25
As required	Pans, saucepan type, enameled, each	.50
	Pliers	
1	Needle nose, 6"	2.50
1	Side-cutting, heavy duty, 7" (for glass nibbling) ...	2.75
1	Soldering iron, electric, $\frac{1}{2}$ " tip, AC or DC	2.50
1	Stone, carborundum combination, 1 side fine, 1 side coarse, 1" x 2" x 6"	1.75
1	Stylus, sharp point	.50
1	Vise, bench, swivel base, anvil cut-off tool, $3\frac{1}{2}$ " jaw	7.50

¹ For two pupils per class.

² May be made in the school shop.

Consumable Supply Lists

The supplies suggested in this bulletin are based on the minimum requirements for two pupils in each subarea or a total of ten pupils in all areas of Ceramics when it is organized as an area of a comprehensive general shop which operates six periods per day for a full school year.

CONSUMABLE SUPPLIES

Unit A: Pottery and Tile¹

<i>Quantity</i>	<i>Item</i>	<i>Approximate Cost</i>
	Clay, dry form	
200 lbs.	White talc modeling	22.00
20 lbs.	Red firing	2.20
20 lbs.	Low fire white	3.20
20 lbs.	Terra cotta	2.40
2 doz. each	Cones, pyrometric (06, 05, 012, 018)	7.20
10 lbs.	Glazes, assorted colors and types	15.00
2 lbs.	Kiln wash	.24
100 lbs.	Plaster of Paris	7.00
1 gross	Stilts (1, 2, 3)	1.25
1 gross	Triangles (1, 2)	.75

¹ For two pupils per class.



Unit B: Keene Cement¹

<i>Quantity</i>	<i>Item</i>	<i>Approximate Cost</i>
2 qts.	Alcohol	1.20
	Buffs	
2	muslin, 6", 48 ply	3.50
2	flannel, 6", 15 ply	1.80
200 lbs.	Keene cement	14.00
	Keene cement colors	
2 lbs.	black	1.00
2 lbs.	brown	1.00
2 lbs.	red	1.00
2 lbs.	yellow	1.00
1 qt.	Linseed oil	.90
	Paper, garnet abrasive	
100 sheets	4/0 waterproof, 9 x 11	6.50
100 sheets	6/0 waterproof, 9 x 11	6.50
100 sheets	8/0 waterproof, 9 x 11	6.50
2 lbs.	Tripoli	.50
1	Thread, 100-yard spool, Nylon A	.15
As required ²	Wood, soft, for mold-making	

¹ For two pupils per class.

² May be secured from woodworking area.

Unit C: Concrete and Masonry¹

300	Bricks, common face	16.50
10 sacks	Cement, portland, 98 lb. each (order as needed)	12.50
	Concrete masonry units	
25	4" x 8" x 16"	3.75
20	8" x 8" x 16"—regulars	5.00
5	8" x 8" x 8" — halves	.75
5	8" x 8" x 16"—corners	1.30
10 sacks	Lime, hydrated, 70 lb. each	6.50
1 gal.	Oil, motor, SAE 40	1.50
100 lin. ft.	Rod, reinforcing 1/4" dia.	4.00
	Paint, mineral pigment. (See list of sources page 92, Appendix.)	
10 lbs.	Plaster of Paris	.70
50 lbs.	Plaster, casting, with vermiculite	3.50
	Sand	
2 tons	Bar	8.60
2 tons	Jersey	8.60
2 tons	Stone, 1/2"	8.60
1 lb.	Wax, modeling	1.50
25 ft.	Wire, hardware cloth, 1/4" mesh (for reinforcing urns, bowls, etc.), 36" wide	2.95

¹ For two pupils per class.

Varying amounts of lumber in the form of 2 x 3's, 2 x 4's and $\frac{3}{4}$ " surfaced stock will be required depending upon the projects chosen for construction.

Line mortar is commonly used for instructional purposes. This makes it possible to "tear down" a project thus, permitting the re-use of bricks and other masonry units.

Unit D: Metal Enameling¹

<i>Quantity</i>	<i>Item</i>	<i>Approximate Cost</i>
	Cleaner	
1 qt.	Metal, amaco, or equal	1.50
2 cans	Revere copper, or equal	2.00
	Enamels	
3 lbs.	Transparent, acid-resisting in 2 oz. shaker top jars all colors, 80 mesh	7.65
4 lbs.	Opaque, acid-resisting, in 2 oz. shaker top jars all colors, 80 mesh	10.20
1 pt.	Gum solution	.75
2 sets	Overglaze decorating colors, assorted colors, semimoist ..	3.00
4 doz.	Preformed copper shapes, assorted sizes, $\frac{9}{16}$ " dia., 1" dia., 2" dia., 3" dia.	3.00
20 lbs.	Scrap sheet copper, 18 gauge for free form shapes	8.00

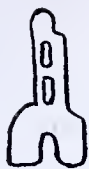
¹ For two pupils per class.

Unit E: Glassworking¹

	Carborundum dust ..	
1 lb.	Cleaner, alkaline	.25
2 lbs.	Copper, sheet, soft	.75
1 tube	Etching cream	.75
$\frac{1}{2}$ lb.	Flux, paste	1.50
1 doz. sheets	Foil, aluminum stencil, heat-sensitive, adhesive-backed, 3" x 6" sheets	2.75
As required	Glass (a selection of cathedral, Flemish, flashed, staining, plain, and other cheap glass to be used for exercises and simple work in stained glass window and mosaic work. Scrap pieces from glass manufacturers ideal)	
1 qt.	Glue, animal	1.95
1 bottle	Ink, drawing, black, waterproof, $\frac{3}{4}$ oz. bottle	.35
	Leads	
1 each	Paint, glass, prepared, 12 colors, $\frac{3}{4}$ oz.	4.20
100 sheets	Paper, drawing, white 18" x 24", 60 lb. substance	2.75
2 lbs.	Plastecine or equal	.80
10 lbs.	Plaster of Paris	.70
2 lbs.	Solder, soft, wire	3.00
1 qt.	Turpentine	.35

¹ For two pupils per class.

POTTERY MARKS



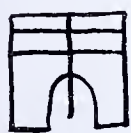
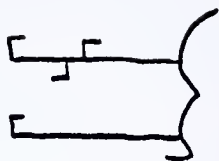
Germany



Italy



Persia



Japan



Russia



France



England



Sweden



Holland



Rockwood

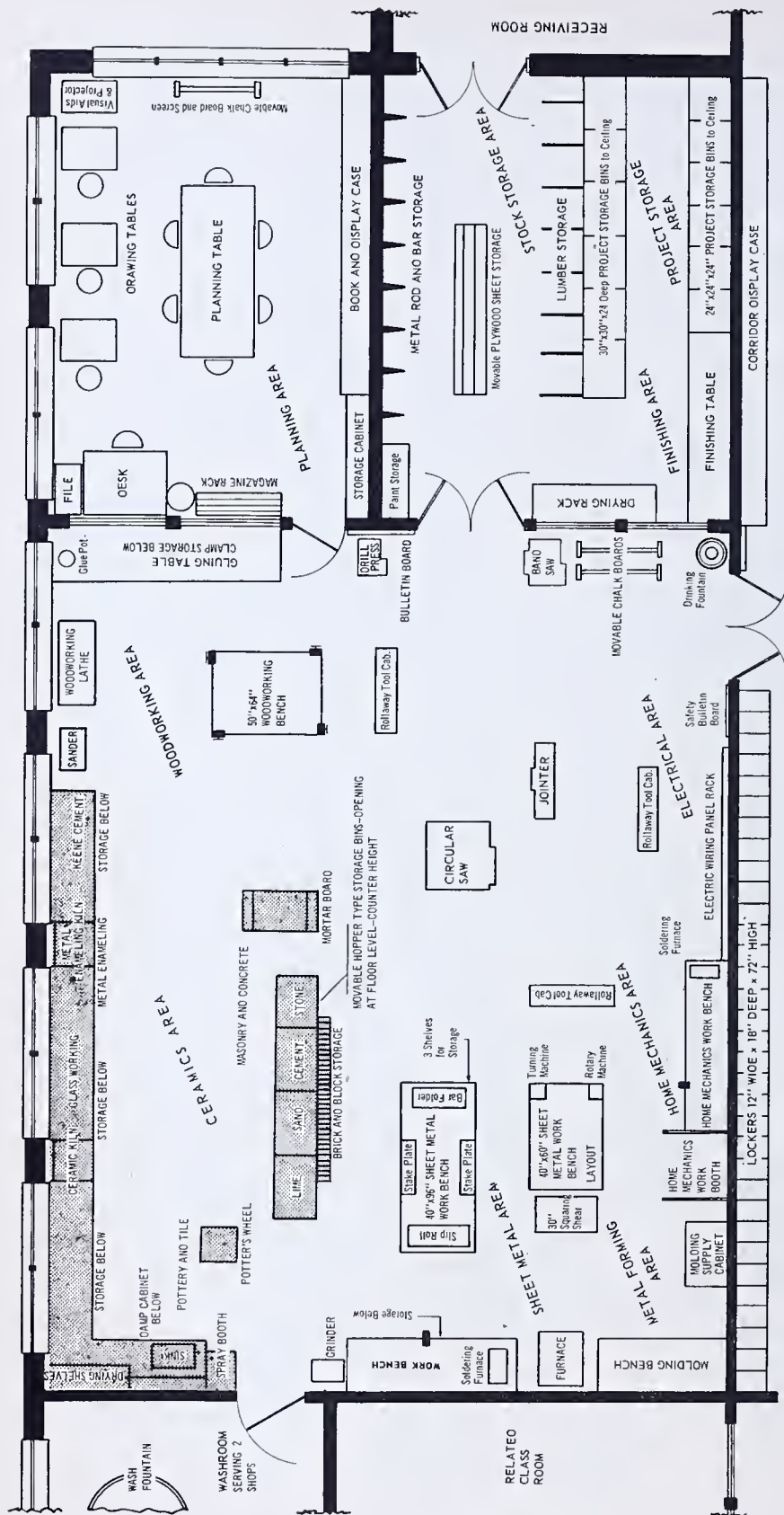


Newcomb
College



Oakwood

AMERICAN



CORRIDOR

TO VOCATIONAL INDUSTRIAL SHOP

6 *Suggested Shop Layout*—

THE CERAMIC AREA is a dirt and dust producing area. It should be removed as far as possible from other areas of a comprehensive general shop. Since many new molds will be made of wood and others will be repaired it is essential that this area be located close to the woodworking area.

On page 90 a suggested layout is shown for a comprehensive general shop with the following Industrial Arts areas of activity:

1. Ceramics
2. Woodworking
3. Planning
4. Sheet Metal
5. Electrical
6. Home Mechanics
7. Metal Forming

Other Industrial Arts areas may be substituted to meet the needs of the particular local school situation. Since many new molds and forms will be made of wood and others will be repaired, it is suggested that woodworking be included as an area of activity and that it be located close to the ceramics area. All areas will use the planning, storage, and finishing facilities and most of the activities listed above will be used by the pupils of the ceramics area due to the varied activities found in ceramics.

The total shop area of this suggested layout is approximately 2100 square feet.

Other supplementary bulletins in this Industrial Arts series contain information concerning equipment for areas other than ceramics.

Appendix

Suggested Sources of Ceramic Supplies and Equipment

GENERAL CERAMIC SUPPLIES

- Adhesives, Incorporated, 663 Main Avenue, Passaic, New Jersey.
- Allied Engineering Division, Ferro Enamel Corporation, 4150 E. 56th St., Cleveland 5, Ohio.
- American Art Clay Company, Indianapolis 24, Indiana.
- American Handicrafts Company, Inc., 45-49 S. Harrison St., East Orange, N. J. and 12 East 41st Street, New York 17, New York.
- Arabol Manufacturing Company, 110 East 42nd St., New York, N. Y.
- B. F. Drakenfeld and Company, Inc., 45 Park Place, New York 7, N. Y.
- Braun-Knecht-Hermann Company, 1400 16th St., San Francisco, California.
- Ceramic Color and Chemical Manufacturing Company, New Brighton, Pa.
- Damerell Manufacturing Company, 154-156 8th Street, Upland, Pa.
- Denver Fire Clay Company, P. O. Box 5510, Denver 17, Colorado.
- Dinkens Ceramic Studio, 507½ W. Davis Street, Dallas, Texas.
- Dudley Studios, 3211 Temple Street, Los Angeles, California.
- George Fetzer, 1205 17th Avenue, Columbus, Ohio.
- Harrop Ceramic Service Company, 3470 E. 5th Avenue, Columbus 19, Ohio.
- Industrial Arts Cooperative Service, 519 W. 121st St., New York, New York.
- Jack D. Wolfe Company, Inc., 62 Horatio St., New York 14, New York.
- L. Reusche and Company, 2-6 Lester Avenue, Newark, N. J.
- Lockart Products, Inc., Pershing Road, Zanesville, Ohio.
- Lone Star Cement Company, 342 Madison Avenue, New York City, N. Y.
- Milligan Hardware and Supply Company, East Liverpool, Ohio.
- Miracle Adhesive Corporation, 300 E. 43rd Street, New York, New York.
- O. Hommel Company, 209 4th Avenue, Pittsburgh 30, Pa.
- Pottery Arts Supply Company, 2552 Greenmount Ave., Baltimore 18, Md.
- Potters Supply Company, East Liverpool, Ohio.
- Specialized Ceramic Corporation, 221 Parkside Road, Plainfield, N. J.
- Stewart Clay Company, 133 Mulberry St., New York, N. Y.
- The E. Harris Company, Limited, 73 King St., East, Toronto 1, Ontario, Canada.
- W. H. Fairchild, 712 Centre Street, Freeland, Pa.
- X-Pando Corporation, 43-45 36th St., Long Island City, N. Y.

KILNS AND KILN FURNITURE

- Bell Ceramics, Incorporated, Dept. C, 21 Midland Avenue, Montclair, N. J.
- Denver Fire Clay, 2301 Blake St., Denver 2, Colorado.
- Harper Electric Furnace Corporation, 1449 Buffalo Ave., Niagara Falls, N. Y.

L and L Manufacturing Company, 804 Mulberry St., Upland, Pa.
Louthan Manufacturing Company, East Liverpool, Ohio.
New Castle Refractories, New Castle, Pa.
Pereny Equipment Company, Columbus, Ohio.
Petterson Multi-Unit Kilns, 1007 S. Acacia St., Compton, California.
Rogers Electric Kilns, Glenside, Pa.

CLAY

Favor, Ruhl and Company, 43 W. 23rd St., New York City, N. Y.
Fellowcrafters, Incorporated, 64 Stanhope St., Boston, Massachusetts.
Great Lakes Foundry Sand Company, 720 United Artist Bldg., Detroit 26, Mich.
Stewart Clay Company, Inc., 133 Mulberry St., New York City, N. Y.
The Kallin Company, 7346 Santa Monica Blvd., Los Angeles, California.

CERAMIC COLORS AND CHEMICALS

DuPont de Nemours and Company, Inc., Wilmington, Delaware.
Hanovia Chemical and Manufacturing Company, Newark, N. J.
Harshaw Chemical Company, 1945 E. 9th St., Cleveland 6, Ohio.
Mason Color and Chemical Works, East Liverpool, Ohio.

PLASTER

Knickerbocker Plaster Company, 522 W. 38th St., New York, N. Y.
National Gypsum Company, Buffalo, New York.
U. S. Gypsum Company, 300 W. Adams Street, Chicago, Illinois.

REFRATORIES AND FIRE BRICK

Carborundum Company, Perth Amboy, New Jersey.
Norton Company, Worcester 6, Massachusetts.

ASBESTOS

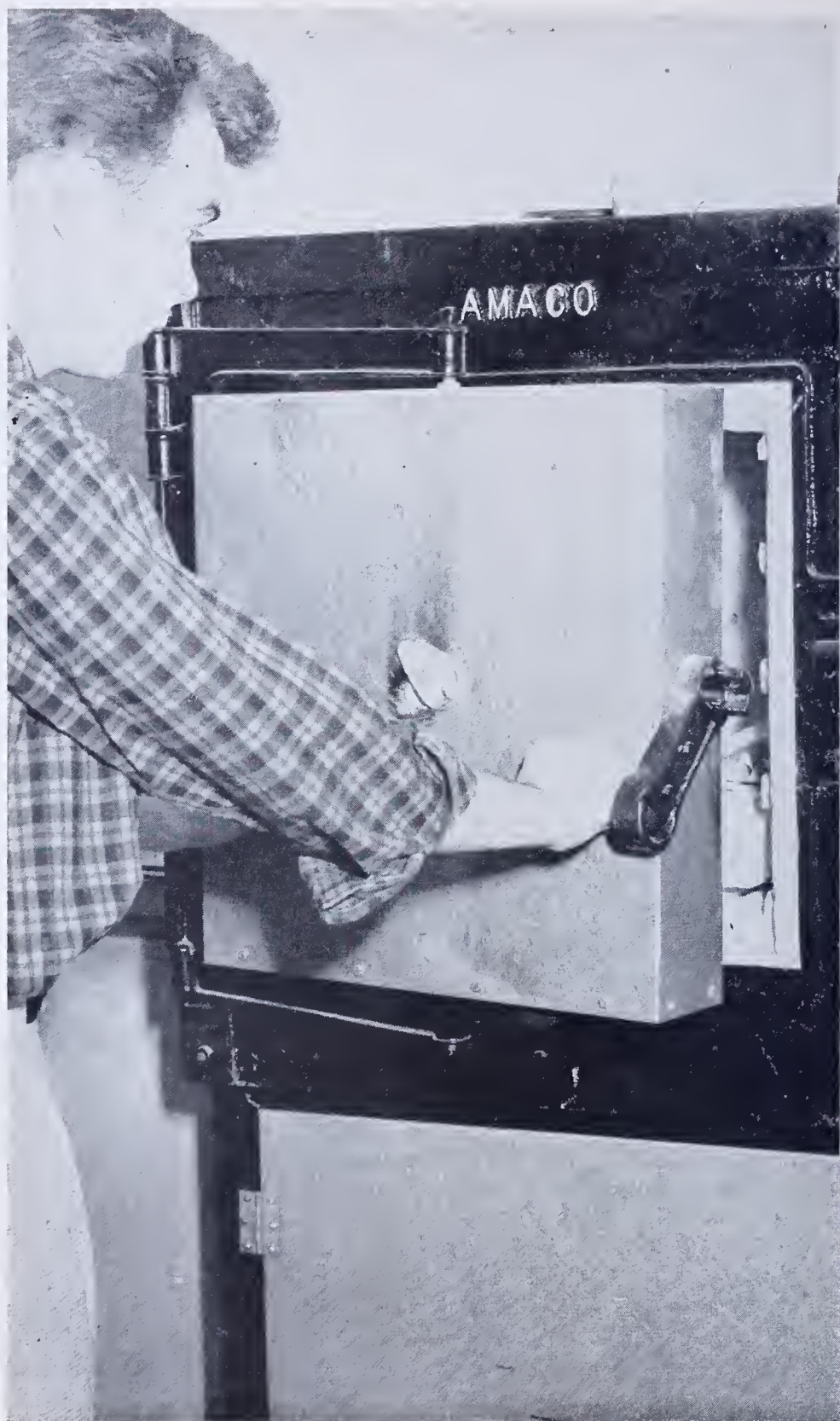
Johns-Manville, 22 East 40th Street, New York, New York.
Metropolitan Refractory Corporation, 192 King St., Brooklyn, New York.

TILE

Acme Tile Company, 160 E. 116th St., New York, New York.
Architectural Tiling Company, Keyport, New Jersey.
Atlantic Tile Manufacturing Company, Matawan, New Jersey.
Central Tile Company, 133 W. 24th St., New York, New York.
Vanderlaan Tile, 103 Park Avenue, New York, New York.
Wheeling Tile Company, Wheeling, West Virginia.

SPRAYING EQUIPMENT

Binks Manufacturing Company, 3114-40 Carroll Ave., Chicago, Illinois.
The DeVilbiss Company, Toledo, Ohio.

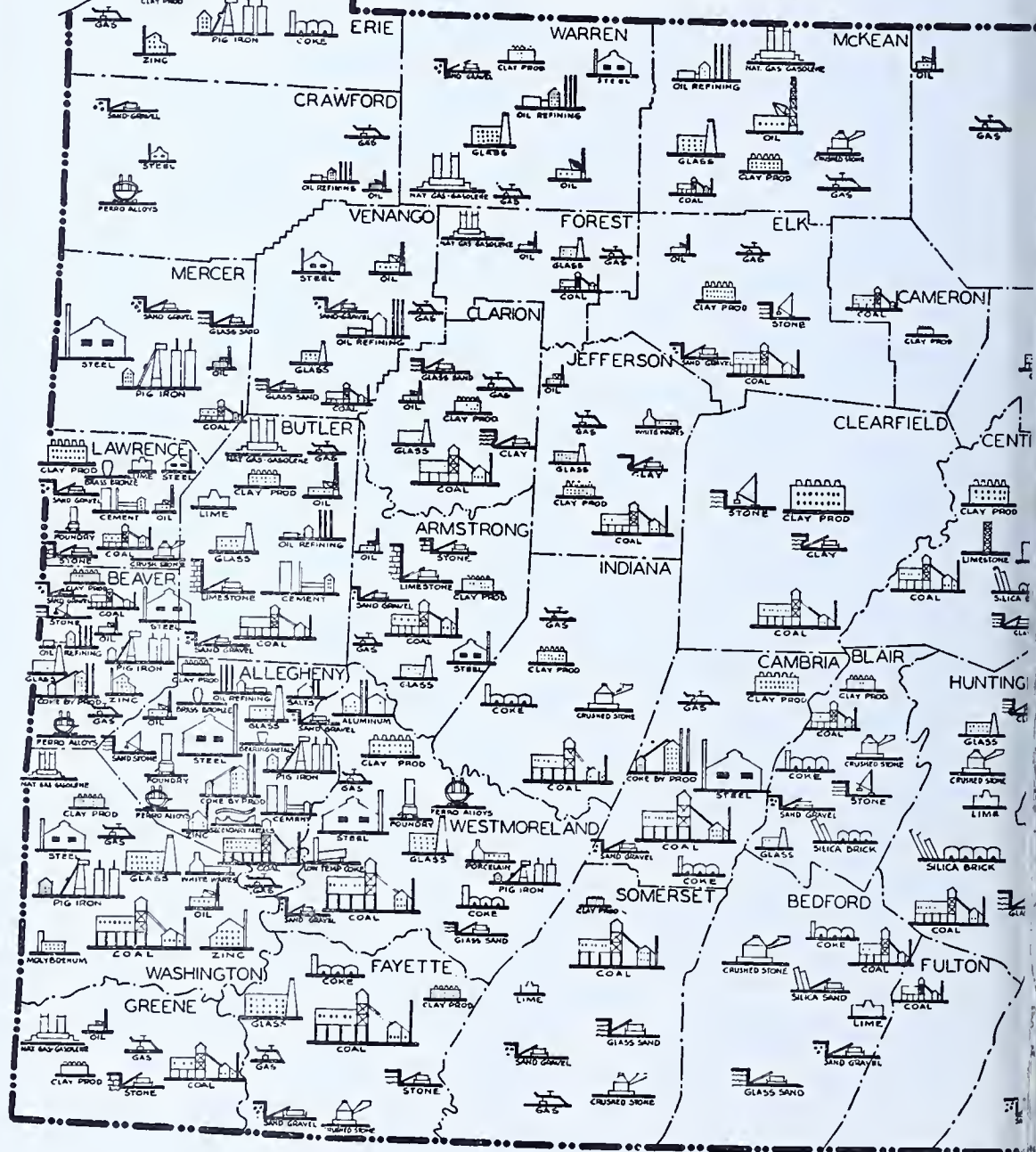




LAKE ERIE

SYMBOLIC MINERAL INDUSTRIAL MAP OF PENNSYLVANIA

SIZE OF SYMBOLS REPRESENTS THE RELATIVE
GENERAL ECONOMIC IMPORTANCE OF THE
INDUSTRIES IN EACH COUNTY.



PA
VE
HF

